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No. 95 OFFICE OF THE CLERK

IN THE
Supreme Court of the United States
OCTOBER TERM, 1995

WARNER-JENKINSON COMPANY, INC.,
Petitioner,
v.

HILTON DAVIS CHEMICAL CO.,
Respondent.

**Petition for a Writ of Certiorari to the
United States Court of Appeals
for the Federal Circuit**

PETITION FOR A WRIT OF CERTIORARI

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QUESTION PRESENTED

Whether patent infringement exists whenever the accused product or process is "equivalent" to the invention claimed in the patent, in that the differences are not "substantial" as determined by a jury, even though the accused product or process is outside the literal scope of the patent claim.

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PETITION FOR A WRIT OF CERTIORARI

Petitioner Warner-Jenkinson Company, Inc., hereby petitions this Court to review the judgment of the United States Court of Appeals for the Federal Circuit in this case.¹ Sitting *en banc* and producing five opinions, the sharply divided court resolved one of the fundamental questions of patent law: to what extent, if any, may infringement be proved under the "doctrine of equivalents," where "literal" infringement cannot be proved because the defendant's product or process does not come within the plaintiff's patent claim? The court, repeatedly invoking precedent of this Court dating from prior to the 1952 Patent Act, adopted the broad view that a patentee al-

¹ Pursuant to Rule 29.1 of the Rules of this Court, Warner-Jenkinson states that it is a wholly owned subsidiary of Universal Foods Corporation and that it has no subsidiaries other than wholly-owned ones.

ways may resort to two different causes of action for infringement—one based on the patent claim's literal coverage of the accused product or process; the other based on the lack of "substantial differences," as found by a jury, between the patented invention and the accused product or process.

OPINIONS BELOW

The opinions of the court of appeals sitting *en banc* (Pet. App. 1a-152a) are reported at 62 F.3d 1512. The unpublished panel opinion of the court of appeals on other issues (Pet. App. 153a-159a) is not reported. The district court's oral opinion on relevant aspects of post-judgment motions (Pet. App. 160a-167a) is not reported.

JURISDICTION

The court of appeals entered judgment on August 8, 1995. Pet. App. 1a, 153a. The jurisdiction of this Court is invoked under 28 U.S.C. § 1254.

STATUTORY PROVISIONS INVOLVED

35 U.S.C. § 111 provides in pertinent part:

Application for patent shall be made, or authorized to be made, by the inventor, except as otherwise provided in this title, in writing to the Commissioner. Such application shall include (1) a specification as prescribed by section 112 of this title

35 U.S.C. § 112 provides in pertinent part:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

* * * *

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

35 U.S.C. § 251 provides in pertinent part:

Whenever any patent is, through error without any deceptive intention, deemed wholly or partly inoperative or invalid, by reason of a defective specification or drawing, or by reason of the patentee claiming more or less than he had a right to claim in the patent, the Commissioner shall, on the surrender of such patent and the payment of the fee required by law, reissue the patent for the invention disclosed in the original patent, and in accordance with a new and amended application, for the unexpired part of the term of the original patent. No new matter shall be introduced into the application for reissue.

* * * *

No reissued patent shall be granted enlarging the scope of the claims of the original patent unless applied for within two years from the grant of the original patent.

35 U.S.C. § 271 provides in pertinent part:

(a) Except as otherwise provided in this title, whoever without authority makes, uses or sells any patented invention, within the United States during the term of the patent therefor, infringes the patent.

STATEMENT

1. This case arises out of separate, independent efforts by petitioner and respondent to develop an improved process, known as ultrafiltration, for removing impurities from certain dyes. Both petitioner and respondent manufacture food dyes, including FD&C Red Dye #40 and Yellow Dye #6. "Historically, [petitioner and respondent] used an expensive and wasteful process known as 'salting out' to purify the dyes." Pet. App. 2a. Ultrafiltration—which "uses osmosis to separate components of a solution by drawing some of the components, but not others, through a membrane" (Pet. App. 2a-3a)—produces a dye of high purity at less cost and with less loss of the dye itself.

It is undisputed in this case that petitioner and respondent developed their respective ultrafiltration processes on parallel tracks. Both of these tracks involved dealings with a company called Osmonics, Inc.² Having been approached by the companies, Osmonics selected certain membranes to be tested and specified the process conditions for those tests—*i.e.*, pH, pressure, and membrane pore size—first for petitioner and later for respondent. After Osmonics demonstrated to both companies that it had succeeded in performing ultrafiltration on their food dyes, respondent (unbeknownst to either Osmonics or petitioner) sought to obtain a patent for the process.

Respondent's initial efforts to obtain a patent met with rejection at the U.S. Patent and Trademark Office (PTO). In October 1984, a PTO Examiner concluded that, given the prior art disclosed in the "Booth patent," the process claimed by respondent was obvious. C.A. Jt. App. 2209.³

² Osmonics, Inc. "was known to specialize in the development of membranes and equipment for fluid purification by ultrafiltration." Pet. App. 85a (Nies, J., dissenting).

³ The Booth patent also disclosed an ultrafiltration process. That process, however, "operates at a pH above 9 and preferably between 11 and 12." Pet. App. 4a; *id.* at 156a. Because pH is a logarithmic

A second application was likewise rejected on grounds of obviousness. *Id.* at 2145-47.

Respondent then met, through its patent agent, with the PTO Examiner, asserting that its claimed process differed in four important respects from the process disclosed in the Booth patent. Of particular importance here, it argued that, while the Booth process operated at a pH level above 9 (*see* note 3, *supra*), its process operated at a pH level between 6 and 9. According to the Examiner Interview Summary Record, "[t]he Examiner stated that if claim 1 were amended to contain the pH range of 6 to 9, the rejection on prior art would be overcome." C.A. Jt. App. 2149. Respondent amended its claim to call for "a pH from approximately 6.0 to 9.0," as well as "hydrostatic pressure of approximately 200 to 400 p.s.i.g." *See* Pet. App. 4a.⁴ As a result, the patent—U.S. Patent No. 4,560,746 (the '746 patent)—issued in December 1985. *See* Pet. App. 3a.

The process developed by Osmonics for petitioner does not fall within the ranges specified in the '746 patent. To the contrary, it is conceded that its process operates at a pH of 5 (and at hydrostatic pressure of nearly 500 p.s.i.g. at the upstream side of the membrane).⁵ It is also conceded that, at the time that petitioner began commercial use of its ultrafiltration process for Red Dye #40, it had no knowledge of the '746 patent, which had just

scale, a single pH unit represents a tenfold difference in hydrogen ion concentration. *See* Pet. App. 62a (Plager, J., dissenting).

⁴ Dr. Cook, a co-inventor of the process claimed in the '746 patent, "testified at trial that though the process would work to separate the dye from the impurities at pH-values as low as 2.0, a solution with a pH below 6.0 would cause 'tremendous foaming problems in the plant.'" Pet. App. 62a (Plager, J., dissenting).

⁵ The process used by petitioner—which utilized a pH of 5.0 for the purpose of decomposing a triazene impurity—employed a different chemistry, making it able to operate at a pH below 6.0 without causing the foaming problems noted by Dr. Cook. *See* note 4, *supra*.

issued, or of the process used by respondent. Pet. App. 5a.

Petitioner learned of the '746 patent in October 1986. It then consulted with patent counsel, who advised that the patent was invalid and that, in any event, it was not infringed by petitioner's process. In particular, counsel stated the opinion that the process—operating, as it did, outside the ranges specified in the '746 patent—did not literally infringe the '746 patent and could not be deemed to infringe under the doctrine of equivalents. Pet. App. 87a (Nies, J., dissenting).

2. Respondent brought suit against petitioner in 1991, alleging that petitioner had infringed the '746 patent. Although it claimed at first that the process developed by petitioner literally infringed the patent, it expressly disavowed this argument before the district court. C.A. Jt. App. 668 ("we are not asserting literal infringement in this case"). It continued to press arguments, however, that petitioner's process infringed the patent under the doctrine of equivalents, as set forth in *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605 (1950), and other decisions. That issue was submitted to a jury, which found infringement (but not willful infringement). It awarded damages of \$3,564,705. See Pet. App. 5a, 167a, 168a.

The district court subsequently denied a motion by petitioner for judgment as a matter of law. Even though the '746 patent had been modified before the PTO to recite a process utilizing "a pH of approximately 6.0 to 9.0," and even though petitioner's process utilized a pH outside that range, the court nevertheless held that the jury had sufficient evidence to conclude that the monopoly granted by the '746 patent extended, under the doctrine of equivalents, beyond the terms of its claims. Pet. App. 165a. As a result, in addition to the award of damages, it issued an injunction barring petitioner from employing its process with *any* pH below 9.01 (and any pressures below 500 p.s.i.g.). Pet. App. 172a.

3. The Federal Circuit, sitting *en banc*, affirmed by a closely divided vote—6 active judges plus one senior judge in the majority; 5 active judges in dissent. (Judge Bryson did not participate.) The issues of validity and infringement were initially argued to a panel of that court, but, before it rendered a decision, the court decided to rehear the issues of infringement *en banc*,⁶ in order "to consider the important issues raised concerning the doctrine of equivalents." Pet. App. 5a.⁷ Its efforts to resolve those issues produced wide disagreement, reflected in five separate opinions.

The majority began by broadly declaring its allegiance to the doctrine of equivalents, stating flatly that "[t]his case presents an opportunity to restate—not to revise—the test for infringement under the doctrine of equivalents." Pet. App. 6a. Observing that this Court had "mapped the modern contours of the doctrine of equivalents in its landmark *Graver Tank* decision" (Pet. App. 7a), the court concluded that the doctrine gave a patent

⁶ The issue of validity later was assigned to the same panel, which held that the '746 patent was valid. Pet. App. 154a-159a. *But see* Pet. App. 90a-102a (Nies, J., dissenting). Petitioner is not seeking review of that ruling.

⁷ The court of appeals sought briefing on three specific questions:

1. Does a finding of infringement under the doctrine of equivalents require anything in addition to proof of the facts that there are the same or substantially the same (a) function, (b) way, (c) result, the so-called triple identity test of *Graver Tank [& Manufacturing Co.] v. Linde Air Products Co.*, 339 U.S. 605 (1950), and cases relied on therein? If yes, what?
2. Is the issue of infringement under the doctrine of equivalents an equitable remedy to be decided by the court, or is it, like literal infringement, an issue of fact to be submitted to the jury in a jury case?
3. Is application of the doctrine of equivalents by the trial court to find infringement of the patentee's right to exclude, when there is no literal infringement of the claim, discretionary in accordance with the circumstances of the case?

holder the right to establish infringement whenever a jury determined that the differences between an accused product and the product claimed in the patent were "insubstantial." See Pet. App. 8a; *id.* at 9a ("this court explicitly holds that the application of the doctrine of equivalents rests on the substantiality of the differences between the claimed and accused products or processes, assessed according to an objective standard"). The court continued to endorse reliance on the familiar "function-way-result" test (Pet. App. 9a) but cautioned that "the function-way-result test may not invariably suffice to show the substantiality of the differences." Pet. App. 10a.⁸

The majority further held, again relying on *Graver Tank*, that "preventing 'fraud on a patent' involves an objective assessment of the substantiality of the differences between the claimed and accused products or processes." Pet. App. 12a (emphasis added). It thus determined that the district court had "correctly resisted [petitioner's] effort to erect an equitable threshold for application of the doctrine of equivalents." Pet. App. 20a. According to the court, evidence of "copying" or "designing around" is relevant to determining the substantiality of differences, but evidence of independent development is not. See Pet. App. 11a-14a; *id.* at 13a ("[e]vidence that the accused infringer developed its product or process through independent research is not directly relevant to the question of infringement under the doctrine of equivalents").⁹ As

⁸ This Court in *Graver Tank* stated that "a patentee may invoke [the doctrine of equivalents] to proceed against the producer of a device 'if it performs substantially the same function in substantially the same way to obtain the same result.'" 339 U.S. at 608 (quoting *Sanitary Refrigerator Co. v. Winters*, 280 U.S. 30, 42 (1929), in turn quoting *Machine Co. v. Murphy*, 97 U.S. (7 Otto) 120, 125 (1878)).

⁹ The majority stated that "[w]hen an attempt to copy occurs, the fact-finder may infer that the copyist, presumably one of some skill in the art, has made a fair copy, with only insubstantial changes." Pet. App. 11a. By contrast, it said, "[w]hen a competitor becomes aware of a patent, and attempts to design around its claims,

a result, "those who make only insubstantial changes to a patented product or process are liable for infringement, regardless of their awareness of the patent and its disclosure." Pet. App. 14a.¹⁰

The court acknowledged that respondent had narrowed its patent claims in order to win approval from the PTO, but held that respondent nevertheless could use the doctrine of equivalents to bar products falling within the surrendered area. To the court, the important issue was not what was surrendered but the *reason* for the surrender. See Pet. App. 24a-25a. Thus, while respondent had explicitly limited its claimed process to recite "a pH from approximately 6.0 to 9.0," the court concluded that a process utilizing a pH of 5.0 was infringing because respondent had amended its claim "to avoid the disclosure in the Booth patent of an ultrafiltration process operating at a pH higher than 9." Pet. App. 24a; see also *ibid.* ("[t]his amendment surrendered pHs above 9, but does not bar [respondent] from asserting equivalency to processes . . . operating sometimes at a pH below 6").

The remainder of the majority opinion was devoted largely to addressing, and rejecting, arguments made by the three dissents. In particular, the majority dismissed the notion that widespread resort to the doctrine of equivalents was fundamentally inconsistent with the specific claiming requirements of the Patent Act itself. In dissent, Judge Plager, noting that the doctrine of equivalents "is regularly used by patentees to seek greater coverage for their patents than the patent statute grants" (Pet. App. 53a), argued that, as defined by the majority, the doctrine

the fact-finder may infer that the competitor, presumably one of skill in the art, has designed substantial changes into the product to avoid infringement." Pet. App. 13a.

¹⁰ The insistence of the majority on an objective "factual" test—albeit one in which the substantiality of differences apparently may turn upon the intent of the alleged infringer (see note 9, *supra*)—enabled it to conclude that application of the doctrine of equivalents was a matter for a jury, not the court. See Pet. App. 14a-18a.

"is a virtually uncontrolled and unreviewable license to juries to find infringement if they so choose." Pet. App. 55a. Judge Plager objected that this expansion of the patented area "is done largely without regard to and independent of the express limitations of the patent claims which may have brought about their allowance by the [PTO] in the first place." Pet. App. 55a. Even though Judge Plager accepted the need for some equitable remedy to prevent virtual duplication—a remedy lying within the discretion of the court—he found no basis for a doctrine broad enough to rescue patent holders from the failure to claim all that they lawfully might have claimed, stating that "[t]he solution to the problem of inadequate or incomplete claim drafting is not arbitrary after-the-fact 'interpretation' under the guise of 'equivalents,' whether by judge or jury, that goes beyond anything in the claims themselves." Pet. App. 62a.

The majority, continuing to rely heavily on *Graver Tank*, disagreed. "According to *Graver Tank*, the 'theory on which [the doctrine of equivalents] is founded is that if two devices do the same work in substantially the same way, and accomplish substantially the same result, *they are the same*, even though they differ in name, form, or shape.'" Pet. App. 26a (quoting *Graver Tank*, 339 U.S. at 608 (internal quotes omitted) (emphasis added by Federal Circuit)). For that reason, the court concluded, the doctrine of equivalents is "quite consistent with the requirement that the patent claim 'particularly point out' and thereby circumscribe the protected invention." Pet. App. 26a-27a. Rejecting the idea that changes in the Patent Act of 1952 had narrowed judicial authority to go beyond the express terms of a patent, the court stated that, "[i]n light of [Supreme Court] authority,"¹¹ there

¹¹ The court of appeals stated that "[a]gainst [a] stable backdrop of statutory definitions of infringement, definitions which are virtually indistinguishable from the current 35 U.S.C. § 271(a), the Supreme Court has recognized actions at law for recovery for infringement under the doctrine of equivalents since its *Winans*

was "no basis to hold that the doctrine of equivalents was rendered extrastatutory and thus equitable by virtue of the silent repeal that the dissent finds in the Patent Act of 1952." Pet. App. 28a.

The court also found no ground for concluding that, once a factual determination of insubstantiality had been made, the doctrine of equivalents turned in any way on the intent of the accused infringer. In dissent, Judge Lourie took a contrary position, stating that "the substantiality of the differences [between the patented and accused processes] is still only one of the factors according to *Graver*, arguably the most important factor, which a court should consider in deciding whether to apply the [doctrine of equivalents]." Pet. App. 74a.¹² Noting that "[t]he whole purpose of the doctrine is to defeat piracy and to do justice to a patentee" (Pet. App. 77a), Judge Lourie said that "[i]ntent to misappropriate someone else's invention is the hallmark of a pirate, and intent must therefore not be excluded if a suitable judgment is to be made concerning the applicability of the [doctrine of equivalents]." Pet. App. 77a. The majority, however, found no merit in this theory: "The Supreme Court, in our view, made the fundamental question 'whether under the circumstances the change [in the accused product or process] was so insubstantial that . . . invocation of the doctrine of equivalents [is] justified.'" Pet. App. 29a (quoting *Graver Tank*, 339 U.S. at 610). The court thus concluded that "[i]nfraction is, and should remain, a strict liability offense." Pet. App. 29a.

v. Denmead decision [56 U.S. (15 How.) 330] in 1854." Pet. App. 28a.

¹² Judge Lourie mentioned several other factors to be considered, including "whether independent development or copying has occurred." Pet. App. 74a. He also noted "any behavior of the patentee that impairs the ability of the public to reasonably understand from the claims what is patented" (Pet. App. 74a-75a) and "the failure of the patentee to seek reissue of the patent to cover such embodiment if it knew of the potential infringement during the permissible statutory time period" (Pet. App. 75a).

Finally, the court rejected a number of arguments made by Judge Nies in dissent, including the argument that respondent could not reclaim under the doctrine of equivalents what it had expressly surrendered before the PTO. Judge Nies pointed out that, "[i]n view of the liberality in current claiming practice, the need for the doctrine of equivalents because of difficulties in drafting claims to cover an invention in all possible forms is a rare case." Pet. App. 103a.¹³ Given that the decision by petitioner to claim a process involving "a pH from approximately 6.0 to 9.0" was made in order to secure approval from the PTO (Pet. App. 4a), Judge Nies reasoned that, "[h]aving narrowed the claim's range of pH to secure the Examiner's withdrawal of his prior rejection, [respondent] may not now resort to the doctrine to cover equivalents thereof." Pet. App. 151a. But the court—looking to "the reasons for claim amendments during prosecution" (Pet. App. 32a), rather than to the terms of the amendments on their face—held that respondent still could invoke the doctrine of equivalents, notwithstanding the restrictions in the claim itself. Pet. App. 31a-32a.

A concurring opinion by Judge Newman expressed considerable doubt about the doctrine of equivalents, but found that "any change in the legal and factual fundamentals so explicitly laid out by the Supreme Court is beyond our judicial authority." Pet. App. 33a.¹⁴ Judge

¹³ Judge Nies also pointed out that a patentee could resort to a statutory reissue procedure (35 U.S.C. §§ 251, 252) in order to gain protection beyond the terms of the original patent. Because the statutory procedure allows competitors to invoke "intervening rights," however, Judge Nies noted that "[t]he patentee is much better off evading the reissue procedure which Congress had provided, and resorting to its counterpart, the doctrine of equivalents, created out of the judiciary's sense of 'fairness.'" Pet. App. 103a-104a.

¹⁴ Judge Newman found that "the court's decision today provides no more certainty than did the 1950 decision in *Graver Tank*, leaving in place the problems of application of the doctrine that have concerned this court." Pet. App. 45a.

Lourie expressed a similar view, stating that, "in light of *Graver*, it may be that only the Supreme Court, writing without the confining strictures of *Graver*, can deal cleanly with this issue." Pet. App. 79a n.3. And, in his dissenting opinion, Judge Plager expressed regret that the Federal Circuit had failed to address more squarely the widespread problems raised by the doctrine of equivalents, observing that "[w]e and the Supreme Court are the only two appellate courts with authority to do this." Pet. App. 56a. In his view, the inability of the Federal Circuit to deal with the issue "leav[es] to the Supreme Court the obligation of attending to the problem if it is to be attended to at all." *Ibid.*

REASONS FOR GRANTING THE PETITION

A sharply divided *en banc* Federal Circuit decided one of the fundamental questions of patent law in this case: the scope of patent law's protection against "infringement." See 35 U.S.C. § 271(a). The court held that the Patent Act precludes a defendant's unauthorized making, using, or selling of its product or process *either* if it comes within the terms of the plaintiff's patent claim *or* if, though outside the patent claim, it is found by a jury to lack a "substantial difference" with the patented product or process. Under the court's ruling, proof of infringement through the "doctrine of equivalents" is a broadranging and generally applicable supplement to proof of "literal" infringement: it is freely available to any patentee as a second theory of infringement when proof of literal infringement fails.

This ruling warrants review, first of all, because of its elemental importance to patent law and patent litigation. No question can be more basic, or more common, than the scope of protection against infringement: that is, whether infringement is tied to the patent claim that gives the world notice of the legally protected monopoly; or whether it extends more broadly to all products or processes that a jury may later determine to be "substan-

tially equivalent." The Federal Circuit's adoption of the latter broad view leads to obvious uncertainty and complication both for inventors seeking to comply with the patent laws and for litigants in patent disputes. Before such a view becomes the definitive law of the land, this Court should fully and freshly consider whether, with its evident and substantial costs, the Federal Circuit's expansive doctrine of equivalents is truly compatible with the 1952 Patent Act. That is particularly so because the Federal Circuit, finding the "modern contours" of the doctrine to be dictated by precedent of this Court pre-dating the 1952 Act (*see* Pet. App. 7a), plainly did not undertake such a complete examination of this fundamental issue.

Review is warranted, in addition, because the ruling of the Federal Circuit is deeply flawed. By setting a loose standard of "substantial" equivalence to condemn products or processes that are concededly outside the scope of a patent claim, the ruling undermines the Patent Act's insistence, as a core part of the general statutory bargain offered inventors, that a patentee define with precision the contours of what is claimed as the protected monopoly (35 U.S.C. § 112). Under the Act, it is the obligation of the patentee to put the world on exact notice of what is protected and what is freely available, as a condition of securing the legal monopoly that excludes others from even the most innocent infringement (35 U.S.C. § 271). *See Bonito Boats v. Thunder Craft Boats*, 489 U.S. 141, 150, 159 (1989) (noting "the bargain held out by the federal patent system of disclosure in exchange for exclusive use"); *Universal Oil Prods. Co. v. Globe Oil & Refining Co.*, 322 U.S. 471, 484 (1944) ("quid pro quo" for monopoly is "precision of disclosure"). The broad doctrine of equivalents also overrides Congress's specific provision granting protection for "equivalents" for a targeted class of patents. 35 U.S.C. § 112. And, by allowing all patentees broad protection

beyond the terms of the claims that they wrote, the Federal Circuit's ruling effectively allows for modification of patent claims in disregard of Congress's specifically limited provisions for modification (35 U.S.C. §§ 251, 252).

Contrary to the Federal Circuit's view, this Court's 1950 decision in *Graver Tank* does not mandate or authorize this upsetting of the congressional choices embodied in the 1952 Patent Act. Moreover, neither *Graver Tank* nor judicial concerns for flexibility in protecting patentees can justify expansion of the patent monopoly in situations, like the present, where (a) the patentee clearly could have protected itself, but instead is invoking the "equivalents" doctrine to cover what it deliberately excluded from coverage in its claims, and (b) the defendant has engaged in no fraud, knowing copying, or other bad faith conduct, but instead created its product independently of any knowledge of the patent or, indeed, of the patented product or process. This Court should grant review to reverse the Federal Circuit's broad definition of the doctrine of equivalents, which creates infringement liability, based on a jury determination of "insubstantial differences," even in such circumstances.

I. THE CASE PRESENTS A FUNDAMENTAL QUESTION OF PATENT LAW THAT THIS COURT SHOULD RESOLVE.

1. The decision in this case is of extraordinary, widespread importance in the field of patent law. The Federal Circuit itself recognized the significance of the issues presented, ordering *sua sponte* that the case be heard *en banc* in order "to consider the important issues raised concerning the doctrine of equivalents." Pet. App. 5a. Briefs *amicus curiae* were then filed by many, if not most, of the major professional associations concerned with patent law.¹⁵ As one brief put it, the proper scope of the

¹⁵ The various *amici curiae* included the American Intellectual Property Law Association; the Federal Circuit Bar Association;

doctrine of equivalents presents a question "of national public importance." C.A. Brief for *Amicus Curiae* American Bar Ass'n at 1.

The reason that the issue is important is not hard to fathom. Because the doctrine of equivalents allows patent holders to claim protections beyond the terms of the patent itself, the definition given to the doctrine may well affect "the vast majority of patent infringement lawsuits." C.A. Brief for *Amicus Curiae* American Bar Ass'n at 2. See also C.A. Brief for *Amicus Curiae* Federal Circuit Bar Ass'n at 2, 10 (court's resolution of "basic" issues presented "will affect many users of the patent system"). As commentators have noted, "the doctrine of equivalents, once thought to be a narrow doctrine designed to prevent 'fraud on a patent,' has become an issue of fact to be resolved in virtually every patent suit." Martin Adelman & Gary Francione, *The Doctrine of Equivalents in Patent Law: Questions That Pennwalt Did Not Answer*, 137 U. Pa. L. Rev. 673, 699 (1989) (footnote omitted).¹⁶ Indeed, as one dissenting opinion stated the problem, "[a]ny patentee may invoke [the doctrine]

the American Bar Association; the Houston Intellectual Property Law Association; the Intellectual Property Law Institute; the Iowa State Bar Association; and the California Association for the Advancement of Technology and Invention.

¹⁶ See Robert Bajefsky, *Patent Equivalency: The Jury Is Still In*, Legal Times, Sept. 4, 1995, at 28, 31 ("In recent years, decisions of the Federal Circuit ha[d] suggested dissatisfaction with the doctrine . . . [and its having] become the second prong in the test for infringement in every patent infringement case. At least some Federal Circuit judges wrote opinions limiting the availability of the doctrine . . ."; discussing *Loctite Corp. v. Ultraseal Ltd.*, 781 F.2d 861 (Fed. Cir. 1985); *Valmont Industries, Inc. v. Reinke Mfg. Co.*, 983 F.2d 1039 (Fed. Cir. 1993); *London v. Carson Pirie Scott & Co.*, 946 F.2d 1534 (Fed. Cir. 1991); *Texas Instruments Inc. v. United States Int'l Trade Comm'n*, 805 F.2d 1558 (Fed. Cir. 1986); *Charles Greiner & Co. v. Mari-Med Mfg.*, 962 F.2d 1031 (Fed. Cir. 1992)); William Rooklidge, *Federal Circuit Unsettles Doctrine of Equivalents*, National Law Journal, Oct. 23, 1995, at C43 (same).

as a second prong to an infringement suit, in addition to the statutory cause of literal infringement," and today "the doctrine is regularly used by patentees to seek greater coverage for their patents than the patent statute grants." Pet. App. 53a (Plager, J., dissenting).¹⁷

Although any resolution of the issue would involve a matter of great importance, the *actual* resolution—giving the doctrine of equivalents expansive reach as a supplement to charges of literal infringement—necessarily will have significant effects on patent holders and their potential competitors. Indeed, the decision below stopped in its tracks a process by which a number of panels of the Federal Circuit, during the past decade, had suggested limits on the reach of the doctrine of equivalents as a broadly available second cause of action for infringement. See note 16, *supra*. In pending as well as potential patent litigation, the immediate effect of the decision is to promote great uncertainty about the scope of patent protection, because the scope of such protection now routinely depends on a jury's broad freedom to determine what differences between products or processes are "substantial."¹⁸ Such uncertainty can be expected to spur additional patent litigation, as patentees decide to pursue suits against defendants who they recognize have not liter-

¹⁷ "In recent years, perhaps in part due to the restatement, resetting and strengthening of U.S. patent law by [the Federal Circuit's] decisions (and in the absence of a strong countervailing doctrine of patent misuse), some patentees have more frequently alleged infringement of their patents by competitive devices, compositions or methods which are increasingly beyond the literal scope of the patent claims—assertions which could be alleged only under the doctrine of equivalents." C.A. Brief for *Amicus Curiae* American Intellectual Property Law Ass'n at 5-6.

¹⁸ See Pet. App. 118a n.19 (Nies, J., dissenting) (noting statistics showing that well over half of patent trials are now tried to jury, whereas tiny proportion were tried to jury in 1968-1970); *In re Lockwood*, 50 F.3d 966, 980 n.1 (Fed. Cir. 1995) (Nies, J., dissenting from denial of rehearing *en banc*), vacated, 64 U.S.L.W. 3182 (Sept. 1, 1995).

ally infringed their patents. And this uncertainty likewise threatens to lengthen and complicate litigation, as the parties and courts undertake a wide-ranging inquiry into whether "substantial differences" exist between the accused and patented products or processes. See *Adelman & Francione*, 137 U. Pa. L. Rev. at 699 ("the factual nature of the equivalents inquiry makes summary judgment very difficult to get in any case in which the doctrine of equivalents is raised").

The Federal Circuit's ruling can be expected to have adverse effects outside the system of patent litigation as well. The Federal Circuit recognized that "[t]he ability of the public successfully to design around—to use the patent disclosure to design a product or process that does not infringe, but like the claimed invention, is an improvement over the prior art—is one of the important public benefits that justify awarding the patent owner exclusive rights to his invention." Pet. App. 13a. But the greater the uncertainty about the precise scope of the protected invention to be "designed around," the greater the inhibition on a new inventor's ability and willingness to try to invent in the area of the patent. The broad doctrine of equivalents of the Federal Circuit is likely to have just such a dampening effect on innovation, because it makes inventors distinctly less able to rely on the supposedly precise notice provided by patent claims as to what is legally protected and what is not. Indeed, the United States cited these adverse effects in urging this Court in 1970 to reconsider and repudiate the doctrine of equivalents as "irreconcilable with fundamental principles of congressional patent policy." Brief for United States as *Amicus Curiae* at 16, *Standard Indus. v. Tigrett Indus.*, No. 445, October Term 1969; see *id.* at 14 (quoting *United Carbon Co. v. Binney Co.*, 317 U.S. 228, 236 (1942)) ("[a] zone of uncertainty which enterprise and experimentation may enter only at the risk of infringement claims would discourage invention

only a little less than unequivocal foreclosure of the field' ").¹⁹

2. This is not a case, moreover, in which it is appropriate to leave the Federal Circuit to its own devices in settling an important question of patent law. In many cases, of course, restraint in reviewing Federal Circuit decisions on patent law is appropriately grounded in the confidence that, with its grant of exclusive jurisdiction, the Federal Circuit has authoritatively settled a question of patent law uniformly for the Nation after full consideration, in light of its accumulated expertise in the area, of all relevant aspects of the question. *Cf. Bonito Boats*, 489 U.S. at 162 (exclusive jurisdiction to ensure nationwide uniformity). But the premise of that deference is lacking here. The Federal Circuit plainly did not feel itself empowered to solve the problems presented by the doctrine of equivalents; instead, at virtually every turn, it invoked what it regarded as binding precedent of this Court.

The majority thus repeatedly expressed the view that it was constrained to reach its interpretation of the doctrine of equivalents by this Court's *Graver Tank* decision (and predecessor decisions). See, e.g., Pet. App. 6a-9a (*Graver Tank* establishes "substantiality of the differences" test); *id.* at 9a-14a (*Graver Tank* determines elements of "substantiality" inquiry); *id.* at 14a-17a (*Graver*

¹⁹ See Pet. App. 55a (Plager, J., dissenting) ("The obligation on the inventor to particularly point out and distinctly claim what the applicant regards as his invention, . . . the legitimate practice of competitive designing around, and the opportunities given to the public to benefit from the mandatory disclosures required of the patentee, all are thrown into disarray by this unpredictable aspect of current patent litigation.").

The Federal Circuit Bar Association explained to the Federal Circuit in its *amicus* brief (at 12): "the current test is highly indefinite and imposes severe costs on the public from a lack of notice. It is a major source of uncertainty when assessing patent disputes before and during litigation." (footnote omitted).

Tank determines factual character of "equivalents" question). Then, faced with the dissents' detailing of a host of fundamental difficulties presented by its broad doctrine of equivalents (*see* pages 9-13, *supra*), the majority did not respond either by denying the reality or seriousness of those difficulties or by undertaking its own thorough analysis of the Patent Act and its requirements. *See* Pet. App. 25a-32a. Instead, at each crucial point, the majority responded in effect that it was not free to rethink the doctrine because this Court's precedents up to and including *Graver Tank* supplied a controlling answer. *See* Pet. App. 25a (fact question for jury); *id.* at 26a-27a (*Graver Tank* declares doctrine of equivalents to be consistent with the statutory insistence on precise claiming); *id.* at 27a-28a (1952 Act did not displace *Graver Tank*); *id.* at 28a-29a (*Graver Tank* precludes addition of elements to "substantiality" test); *id.* at 30a (*Graver Tank* "settled the question of the standard of review in doctrine of equivalents cases, foreclosing the dissent's contention"); *id.* at 30a-31a (relying entirely on *Graver Tank* for denial that doctrine of equivalents effectively allows enlargement of claim scope); *id.* at 31a-32a (further reliance on *Graver Tank*).

In this unusual circumstance, as the dissents pointed out, authoritative resolution of the continuing force of *Graver Tank* and of the continuing role and contours of the doctrine of equivalents can come only, and should come, from this Court. *See* Pet. App. 56a (Plager, J., dissenting) ("in today's opinion, the majority abdicates this responsibility [to address the problems caused by its readings of Supreme Court decisions], leaving to the Supreme Court the obligation of attending to the problem if it is to be attended to at all"); *id.* at 68a-69a; *id.* at 79a (Lourie, J., dissenting). Judge Lourie put the point most bluntly, stating that, "in light of *Graver*, it may be that only the Supreme Court, writing without the confining strictures of *Graver*, can deal cleanly with this

issue." Pet. App. 79a n.3.²⁰ Indeed, a member of the majority (Judge Newman), while lamenting that "the court's decision today provides no more certainty than did the 1950 decision in *Graver Tank*" (Pet. App. 45a), nonetheless concluded that "any change in the legal and factual fundamentals so explicitly laid out by the Supreme Court is beyond our judicial authority." Pet. App. 33a.²¹

II. THE DECISION OF THE COURT OF APPEALS IS SERIOUSLY FLAWED ON THE MERITS.

1. The Federal Circuit's decision, giving broad play to a jury-determined protection against "substantial" "equivalents," is deeply inconsistent with the Patent Act. The Federal Circuit seemed to view its interpretation of the doctrine of "equivalents" as a construction of the provision protecting patentees against "infringement," 35 U.S.C. § 271(a). Pet. App. 27a-28a. As a textual matter, however, that central provision of the statute, both by its own terms and by the ordinary rules of statutory construction, must be interpreted in light of and in accord with the remainder of the Patent Act. *See John Han-*

²⁰ Judge Lourie went on to point out that "[a]mong the reasons why the bench and bar have struggled so much and so long to define the [doctrine of equivalents] are the ambiguity of the *Graver* opinion, the fact that many of today's patent cases are tried to juries and the *Graver* case did not involve a jury, and the greater complexity of today's patented high technology inventions compared with those made 50 or more years ago." Pet. App. 79a n.3. He concluded that "*Graver* speaks to a time that is long past." *Ibid.*

²¹ Judge Newman is not alone in pointing out the confusion engendered by the decision below. A recent commentary on the Federal Circuit's decision, by the principal author of the American Bar Association's *amicus* brief in the court of appeals, concludes: "The court's decision . . . raises more issues for both the patent bar and the business community than it resolves. . . . Most patent cases that go to trial—the close cases—involve infringement under the doctrine. . . . *Hilton Davis* adds little but uncertainty to the law of patent infringement." William Rooklidge, *Federal Circuit Unsettles Doctrine of Equivalents*, National Law Journal, Oct. 23, 1995, at C43, C45.

cock Mut. Life Ins. Co. v. Harris Trust & Sav. Bk., 114 S. Ct. 517, 523 (1993) (provision must be read in light of entire statute). This familiar approach to statutory construction shows that the Federal Circuit's view of protection against "equivalents" stands in sharp tension with the Act as a whole.

By its terms, Section 271 defines "infringement" to mean the unauthorized making, using, or selling of "any patented invention." 35 U.S.C. § 271(a). Although the Federal Circuit asserted that "the statutory definition of infringement . . . makes no reference to claims at all" (Pet. App. 27a), the meaning of the provision naturally turns on what the "invention" is that may not be made, used, or sold, and Section 112 directly addresses that question in terms of "claims." In particular, Section 112 requires the patent applicant (a patentee by the time of the subsequent infringement litigation) to conclude its "specification" "with one or more *claims* particularly pointing out and distinctly claiming the subject matter which the applicant regards as *his invention*." 35 U.S.C. § 112 (emphasis added). The claims set forth in the patent thus define the invention and, hence, the scope of what is protected under Section 271. Yet, contrary to that textual tying of "infringement" to the "claims" that define the "invention," the essence of the Federal Circuit's doctrine of equivalents is to provide protection in every case for *more* than is set forth in the claims.

The doctrine of equivalents, as defined by the court below, is inconsistent not only with the text of the Patent Act but with well-established statutory policy as well. The immediate purpose of the fundamental requirement of precision in claiming is to give the world clear notice of the exact scope of the federally protected monopoly—a notice that *must* be precise if there is to be strict liability for infringement.²² "The doctrine of equivalents, if

²² See 35 U.S.C. § 271; *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 478 (1974). Protection of patent rights, which are declared

applied broadly, can eviscerate both the claiming system and the goal of providing notice to the public of the scope of the patent. The doctrine achieves these results by enlarging, in an unpredictable way, the scope of the patent beyond the boundaries claimed by the applicant" Adelman & Francione, 137 U. Pa. L. Rev. at 680. Thus, as the United States explained to this Court in 1970, "[t]he judicially-created doctrine of equivalents runs counter to the statutory requirement that the subject of a patent be precisely defined in the patent claims." Brief for United States as *Amicus Curiae*, *supra*, at 10-11.

This Court has repeatedly made clear the fundamental importance and purpose of precise definition of the protected claim, a requirement of patent law that long predates the 1952 Act. "The statutory requirement of particularity and distinctness in claims is met only when they clearly distinguish what is claimed from what went before in the art *and clearly circumscribe what is foreclosed from future enterprise*." *United Carbon Co. v. Binney & Smith Co.*, 317 U.S. 228, 236 (1942) (emphasis added); *id.* at 232 (quoting *General Elec. Co. v. Wabash Appliance Corp.*, 304 U.S. 364, 369 (1938), and *Permutit Co. v. Graver Corp.*, 284 U.S. 52, 60 (1931)) ("The inventor must 'inform the public during the life of the patent of the limits of the monopoly asserted, so that it may be known which features may be safely used or manufactured without a license and which may not.'"); *Universal Oil Prods. Co.*, 322 U.S. at 484 (in addition to serving to enable others to make the invention when the legal

after careful and presumptively valid action by an administrative agency seeking to define the ambit of the protected intellectual property (35 U.S.C. § 282), contrasts sharply with the higher standard of liability (requiring proof of copying) protecting copyrighted works, for which judicial definition of the scope of what is protected is inevitable because no agency "claiming" system defines the rights in advance. See Adelman & Francione, 137 U. Pa. L. Rev. at 703-05.

monopoly expires, "precision of disclosure is likewise essential to warn the industry concerned of the precise scope of the monopoly asserted"). The Court has thus emphasized that "[t]he claim is a statutory requirement, prescribed for the very purpose of making the patentee define precisely what his invention is; and it is unjust to the public, as well as an evasion of the law, to construe it in a manner different from the plain import of its terms." *White v. Dunbar*, 119 U.S. 47, 51-52 (1886). The Federal Circuit's flexible doctrine of equivalents, however, deprives the public of its ability to rely on the precisely drafted claims as the reach of the legal monopoly.²³

The importance of precise notice to the public underlies what the Federal Circuit acknowledged to be the "well settled" "rule against enlargement of claim scope during claim construction." Pet. App. 30a; see *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 339-40 (1961); *Universal Oil Prods. Co.*, 322 U.S. at 484-85; *Keystone Bridge Co. v. Phoenix Iron Co.*, 95 U.S. (5 Otto) 274, 278-79 (1877). The court of appeals managed to get around this rule, however, by the device of declaring that inventions deemed to be "equivalents" are actually "'the same'" as the patented invention. Pet. App. 30a, quoting *Graver Tank*, 339 U.S. at 608. But it is mere wordplay, and bad wordplay at that, to say that a product or process falling outside the protection of "literal" infringement—precisely because it is different from the invention as set forth in the patent claim—is, in fact, the same as that invention. In so saying, the court is doing nothing more or less than enlarging the claim in exactly the manner forbidden by the rule against

²³ The effect of the doctrine is readily apparent in this case. Although respondent conceded that the process devised by petitioner (which operates at a pH of 5.0) did not come within the literal terms of its patent (which claims a process operating at a pH of approximately 6.0 to 9.0), it was able to obtain an injunction against use of any pH below 9.01, as well as damages—all under the doctrine of equivalents.

expansion in claim construction. In both situations, "the courts have no right to enlarge a patent beyond the scope of its claim as allowed by the Patent Office When the terms of a claim in the patent are clear and distinct (as they always should be), the patentee, in a suit brought upon the patent, is bound by it. . . . He can claim nothing beyond it." *Keystone*, 95 U.S. at 278.²⁴

2. The foregoing statutory policies, of course, are not absolute. In the Patent Act itself, Congress wrote several specific provisions giving patentees means to protect themselves against too narrow a protection. In particular, Congress provided in Section 112 that "[a]n element in a claim for a combination may be expressed as a means or step for performing a specified function" and "such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." 35 U.S.C. § 112 (emphasis added). Indeed, the doctrine of equivalents was evidently the background against which this language was written into the 1952 Patent Act. See Pet. App. 102a & n.9 (Nies, J., dissenting) (legislative history reciting explanation from Justice Department official). The decision below, however, allows a patentee to obtain protection for equivalents even though they are not within the targeted statutory provision on "equivalents." As Judge Nies noted, "[i]f a patentee chooses to draft a claim in other form, it is reasonable to conclude Congress intended that the patentee should be bound by the literal language of the claim." Pet. App. 102a-103a.

²⁴ There is no meaningful difference between defining the range of equivalents protected by a rule of strict infringement liability and defining the scope of the claim. Nevertheless, the Federal Circuit assigned the question of equivalents to the jury, even while it elsewhere held—in a decision now under review in this Court—that the construction of a patent claim is a matter of law for the court. See *Markman v. Westview Instruments, Inc.*, 52 F.3d 967 (Fed. Cir. 1995), cert. granted, 64 U.S.L.W. 3238 (No. 95-26; granted Sept. 27, 1995).

Congress also provided in the Act for the very sort of correction of mistakes that the judicial doctrine of equivalents serves to accomplish. Section 251 expressly allows for reissue of patents for that purpose, but only under specified conditions, including that the application for reissue be made within two years of the original grant and that intervening rights of competitors be afforded protection. See 35 U.S.C. §§ 251, 252. The Federal Circuit's doctrine of equivalents allows for judicial disregard of the careful limits of these provisions in their protection of patentees. See Pet. App. 102a-103a (Nies, J., dissenting). As a consequence, "[t]he patentee is much better off evading the reissue procedure which Congress has provided, and resorting to its counterpart, the doctrine of equivalents, created out of the judiciary's sense of 'fairness.'" *Id.* at 103a-104a.

3. The Federal Circuit placed almost exclusive reliance on *Graver Tank* in adopting a doctrine of equivalents that is so deeply in tension with the Patent Act. *Graver Tank*, however, cannot bear that weight as controlling authority for allowing patentees to expand their legal protection as the Federal Circuit held. At a minimum, the decision requires fresh reconsideration, for at least three reasons.

First, *Graver Tank* pre-dates the 1952 Patent Act, which, as just noted, speaks with some specificity to at least one problem of "equivalents" and thereby tends to cast doubt on the sort of broad "equivalents" protection recognized by the Federal Circuit. Second, the result in *Graver Tank* was actually to restrict, rather than expand, what the patentee had set forth in its patent claims. Although that result was accomplished in two steps—first an invalidation of certain claims as too broad, then an "equivalents" expansion of the surviving claims—the fact remains that the patent's inclusion of the broad claims, along with the patent's specification, meant that the case

involved no failure of notice to the public: the "infringer was on notice from the patent itself that it was taking an embodiment of the invention." Pet. App. 142a (Nies, J., dissenting); *id.* at 46a, 47a (Newman, J., concurring) (*Graver Tank* "was an easy decision on its facts"; it did not broaden the claim); see Adelman & Francione, 137 U. Pa. L. Rev. at 706-709 (*Graver Tank* actually narrowed the claim). Third, *Graver Tank* itself relied chiefly on older decisions, such as this Court's 5-4 decision in *Winans v. Denmead*, 56 U.S. (15 How.) 330 (1854), construing earlier patent statutes that, at least as applied, "did not require specificity in claiming." Brief for United States as *Amicus Curiae*, *supra*, at 12.²⁵ The current vitality and significance of *Graver Tank* thus should be re-examined by this Court before it is accepted as governing authority for the expansive doctrine adopted by the Federal Circuit.

4. Given the careful balance struck by the statutory scheme itself, any departure from its provisions must be taken with considerable restraint. According to the majority of the Federal Circuit, however, non-literal infringement may be proved in any case based on the answer to a single question: are the differences between the two products (or processes) substantial or insubstantial? If

²⁵ See Pet. App. 110a-118a and C.A. Brief for *Amicus Curiae* Federal Circuit Bar Ass'n at 15 (describing difference between "central claiming" system, generally pre-dating 1870, which allowed patentee to describe the "central" invention and left it to the courts to define the outer boundaries of what was protected, and subsequent "peripheral claiming" regime, which requires the patent itself to specify the outer boundaries of the claimed protection). A doctrine of equivalents is not out of place under a central claiming system; indeed, under such a regime, the courts have little choice but to undertake the job of defining the substance of the imprecisely defined invention. The doctrine, however, does not transpose readily to a statutory scheme demanding that the patent itself precisely define the line separating what is protected from what is not and designating the Patent and Trademark Office, rather than the judiciary, as the central forum for drawing that line.

the answer is the latter, the doctrine of equivalents is available as a basis to impose liability for infringement without regard to any other factors. The answer to the determinative question, moreover, may be provided by a jury, not by the court.

In our view, this definition of an essentially extra-statutory basis for infringement liability casts the net too far. As several of the dissenting judges suggest, it strikes the wrong balance to reward the patent holder, and punish its competitor, in every case where it is determined that only insubstantial differences exist between their products. In particular, there is no good reason to protect a patent holder from a failure to protect itself; nor is it appropriate to impose liability on competitors engaged in the very sort of creative behavior that the patent laws are intended to encourage. In such circumstances, even if a finding of insubstantial differences can be made, the doctrine of equivalents—as an equity-based form of relief, to be applied by the judge—should not be available to impose liability for infringement.

There is thus no basis for invoking the doctrine to protect a patentee where the patentee should be expected to have protected itself but failed to do so. *See generally* Adelman & Francione, 137 U. Pa. L. Rev. at 711-29 (describing this as most frequent use of doctrine and criticizing it). It fits with neither the Act nor any sensible policy to protect a patentee against what it excluded from its patent claim, where it could and should have been responsible for making a well-considered decision to exclude. In other words, the doctrine should not extend patent protection to a variation from the claimed invention that the patentee reasonably could have anticipated at the time it obtained its patent: the fundamental statutory policy of precise notice, coupled with the strict liability rule for infringement, should place the burden on the patentee to explore and make careful decisions about possible relaxations of the limitations that it writes into its claim, thus ensuring that the limitations stated in the

claim ultimately issued to the public are the extent of its claim.²⁶ That means, in particular, that a possible relaxation of a limitation (here, for example, the possible lowering of the 6.0 pH minimum) that was actually considered and rejected for inclusion in the claim by the patentee (here, in the documented process before the PTO) should not later be judicially awarded the patentee. Pet. App. 62a-63a (Plager, J., dissenting) (respondent deliberately inserted 6.0 pH limit during processing of patent application, which originally contained no such limit); *id.* at 150a-151a (Nies, J., dissenting).²⁷

On the other side of the equation, the Federal Circuit was not justified in overriding the statutory commitment to precision of notice where doing so would simultaneously impose liability on defendants who engage in the sort of innovative efforts that the Patent Act is designed to advance. Whether viewed in policy terms or as a separate equity-based cause of action (reflecting *Graver Tank's* concern with "fraud on a patent" (339 U.S. at 608)), any doctrine of equivalents should condemn only bad faith "copying." Independent inventors like petitioner, who neither had nor should have had knowledge of the patent, should not be held liable for non-literal infringement; nor should defendants who, trying to "design around" a patent, reasonably believed that their products

²⁶ Mistakes can be corrected under Section 251, and some "equivalents" protection can be obtained for claims drafted under the provision of Section 112 referring to "equivalents." *See* page 25, *supra*.

²⁷ In this specific circumstance, the restriction on non-literal infringement protection may be phrased as a matter of "prosecution history estoppel" (*see* Pet. App. 130a-131a (Nies, J., dissenting)), but that is merely a label for stating what is, by definition, simply a limit on the availability of infringement protection under the doctrine of equivalents: only what does not appear in the issued patent claim can have been given up in the "prosecution." The reason for the change during the prosecution of the patent application should be irrelevant to the obligation of the patent applicant to protect itself.

were in fact substantially different (even if a factfinder would now find that they were not). At most, only those defendants who essentially knew that they were copying, *i.e.*, who lacked a good faith reasonable belief in non-equivalence with the patented product or process, should be liable. Such a rule would provide breathing space for the very inventive practices encouraged by the Patent Act and the Patent Clause of the Constitution, much as the "knowledge of falsity"/"reckless disregard" standard of libel law provides breathing space for speech protected by the First Amendment. *See Gertz v. Robert Welch, Inc.*, 418 U.S. 323, 342 (1974). In any event, the Federal Circuit's version of the doctrine is unjustifiably sweeping and should be reviewed.

CONCLUSION

The petition for a writ of certiorari should be granted.

Respectfully submitted,

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November 6, 1995

APPENDICES

APPENDIX A

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

93-1088

HILTON DAVIS CHEMICAL CO.,
Plaintiff-Appellee,
v.

WARNER-JENKINSON COMPANY, INC.,
Defendant-Appellant.

Appeal from U.S. District Court for the
Southern District of Ohio, Western Division
Judge Weber

DECIDED: August 8, 1995

Before ARCHER, *Chief Judge*,* RICH, *Circuit Judge*,
COWEN, *Senior Circuit Judge*, NIES, NEWMAN,
MAYER, MICHEL, PLAGER, LOURIE, CLEVEN-
GER, RADER, and SCHALL, *Circuit Judges*.**

Opinion of the court filed PER CURIAM. Concurring
opinion filed by *Circuit Judge* NEWMAN. Dissenting

* Circuit Judge Archer assumed the position of Chief Judge on
March 18, 1994, replacing Circuit Judge Nies.

** Circuit Judge Bryson, who entered on duty on October 7, 1994,
has not participated in the disposition of this case.

opinion filed by *Circuit Judge* PLAGER, in which *Chief Judge* ARCHER and *Circuit Judges* RICH and LOURIE join. Dissenting opinion filed by *Circuit Judge* LOURIE, in which *Circuit Judges* RICH and PLAGER join. Dissenting opinion filed by *Circuit Judge* NIES, in which *Chief Judge* ARCHER joins in part.

PER CURIAM.

Hilton Davis Chemical Co. sued Warner-Jenkinson Co., Inc. for infringement of U.S. Patent No. 4,560,746 (the '746 patent). The jury found that the '746 patent was not invalid and that Warner-Jenkinson infringed under the doctrine of equivalents. The trial court entered judgment on the jury verdict. *Hilton Davis Chem. Co. v. Warner-Jenkinson Co.*, No. C-1-91-218 (S.D. Ohio June 22, 1992). Because substantial evidence supports the jury verdict of infringement, the court *en banc* affirms.¹

BACKGROUND

Hilton Davis and Warner-Jenkinson manufacture dyes, including FD&C (food, drug, and cosmetic) Red Dye # 40 and Yellow Dye # 6. The process of making these dyes yields impurities as byproducts. Manufacturers must remove these impurities from the dyes to meet stringent governmental requirements for food and drug purity. Historically, Hilton Davis and Warner-Jenkinson used an expensive and wasteful process known as "salting out" to purify the dyes. The '746 patent, assigned to Hilton Davis, discloses an improved purification process that replaces salting out with "ultrafiltration." Ultrafiltration uses os-

¹ The court took this case *en banc* to resolve specific questions concerning the doctrine of equivalents. Consequently, the *en banc* court has assigned the issue of validity of the '746 patent, raised by Warner-Jenkinson, to the panel which initially heard the appeal. The validity issue is decided in a separate panel opinion also issued today. See *Hilton Davis Chem Co. v. Warner-Jenkinson Co.*, No. 93-1088 (Fed. Cir. Aug. 8, 1995) (nonprecedential).

mosis to separate components of a solution by drawing some of the components, but not others, through a membrane. Thus, the '746 process filters impure dye solution through a membrane at certain pressures, pHs, and pore diameters. Impurities, but not dye molecules, pass through the membrane, leaving a high purity dye product.

Hilton Davis began its search for an alternative to the salting out process in 1982. The co-inventors of the '746 process, Drs. Cook and Rebhahn, led this project for Hilton Davis. The inventors decided to investigate a membrane separation process. Dr. Cook then hired Osmonics, Inc., a filtration equipment manufacturer, to test the process on a Hilton Davis Red Dye # 40 solution which had been disclosed to Osmonics under a secrecy agreement. The first test, in August 1982, did not succeed. Dr. Cook then instructed Osmonics to perform a second Red Dye # 40 test with specified changes in the test membrane and filtration procedures. This second test, in October 1982, succeeded. Osmonics successfully purified Hilton Davis Yellow Dye # 6 under Dr. Cook's instructions in January 1983.

The inventors filed their initial patent application based on the October 1982 and January 1983 test results. After further in-house testing by Dr. Cook, the inventors filed a continuation-in-part application claiming a broader range of membrane pore sizes. The '746 patent issued in 1985.

The '746 patent claims a process for purifying commercial dyes including Red Dye # 40 and Yellow Dye # 6. Claim 1, the only independent claim at issue, appears in Jepson form. See *In re Jepson*, 1917 C.D. 62, 243 O.G. 525 (Ass't Comm'r Patents 1917). Claim 1 recites:

In a process for the purification of a dye selected from [a group including Red Dye # 40 and Yellow Dye # 6] . . . the improvement which comprises:

subjecting an aqueous solution . . . to ultrafiltration through a membrane having a *nominal pore diameter of 5-15 Angstroms* under a hydrostatic pressure of *approximately 200 to 400 p.s.i.g.*, at a *pH from approximately 6.0 to 9.0*, to thereby cause separation of said impurities from said dye, said impurities of a molecular size smaller than the nominal pore diameter passing [through] said membrane and said dye remaining in the concentrate, and when substantially all said impurities have been removed from said concentrate . . . recovering said dye, in approximately 90% purity from said concentrate by evaporation of said concentrate to dryness.

(Emphasis added.) The inventors added the phrase "at a pH from approximately 6.0 to 9.0" during prosecution to distinguish U.S. Patent 4,189,380 to Booth et al. (the Booth patent). The Booth patent discloses an ultrafiltration process that, among other differences from the '746 process, operates at a pH above 9 and preferably between 11 and 13.

Warner-Jenkinson developed its accused ultrafiltration process for Red Dye # 40 and Yellow Dye # 6 in 1986. Like the '746 process, Warner-Jenkinson's accused process included ultrafiltration through a membrane. At trial, Hilton Davis showed that Warner-Jenkinson's process operated at pressures somewhere in a range of 200 to nearly 500 p.s.i.g. and a pH of 5. While Hilton Davis did not present actual pore size measurements for Warner-Jenkinson's membrane, several experts testified that a membrane collecting Red Dye # 40 and Yellow Dye # 6 would have a nominal pore diameter of 5 to 15 Angstroms.

In 1982, Warner-Jenkinson had tested a membrane separation process on a dye solution that had already been salted out. Warner-Jenkinson, like Hilton Davis, hired Osmonics under a secrecy agreement to perform its test. Osmonics performed the Warner-Jenkinson test in August

1982, one week before it performed the first Hilton Davis test. The Warner-Jenkinson test was not successful, however because it did not produce a sufficiently pure dye. After the unsuccessful test, Warner-Jenkinson ceased work on filtration of Red Dye #40 and Yellow Dye #6 until 1986.

Warner-Jenkinson did not learn of the '746 patent until October 1986, after it had begun commercial use of its ultrafiltration process to purify Red Dye # 40. Hilton Davis learned of Warner-Jenkinson's process in 1989 and sued Warner-Jenkinson for patent infringement in 1991.

After considering extensive evidence offered over nine days, the jury found that the '746 patent was not invalid and that Warner-Jenkinson infringed under the doctrine of equivalents. The jury found that Warner-Jenkinson did not willfully infringe, however, and awarded only 20% of Hilton Davis' request in damages. The district court then denied Warner-Jenkinson's post-trial motions, and entered a permanent injunction prohibiting Warner-Jenkinson from practicing ultrafiltration except at pressures above 500 p.s.i.g. and pHs above 9.01.

Warner-Jenkinson appealed the infringement and validity findings. After a panel of this court heard oral argument on July 9, 1993, the court *en banc* decided to rehear the appeal to consider the important issues raised concerning the doctrine of equivalents. This court asked the parties to brief three questions:

1. Does a finding of infringement under the doctrine of equivalents require anything in addition to proof of the facts that there are the same or substantially the same (a) function, (b) way, and (c) result, the so-called triple identity test of *Graver Tank [& Manufacturing Co.] v. Linde Air Products Co.*, 339 U.S. 605 (1950), and cases relied on therein? If yes, what?

2. Is the issue of infringement under the doctrine of equivalents an equitable remedy to be decided by the court, or is it, like literal infringement, an issue of fact to be submitted to the jury in a jury case?
3. Is application of the doctrine of equivalents by the trial court to find infringement of the patentee's right to exclude, when there is no literal infringement of the claim, discretionary in accordance with the circumstances of the case?

Oral argument directed to the *en banc* questions occurred on March 7, 1994.

DISCUSSION

I.

This case presents an opportunity to restate—not to revise—the test for infringement under the doctrine of equivalents. Courts have applied the doctrine of equivalents to protect the substance of the patentee's right to exclude since the first few decades after enactment of the Patent Act of 1790, ch. 7, 1 Stat. 109. Sitting as Circuit Justice, Justice Story, the leading intellectual property scholar of that era, stated:

Mere colorable differences, or slight improvements, cannot shake the right of the original inventor.

Odiorne v. Winkley, 18 F. Cas. 581, 582 (C.C.D. Mass. 1814) (No. 10,432) (Story, C.J.). Indeed, the Supreme Court has consistently recognized the doctrine of equivalents as a protection for patent owners. See, e.g., *Winans v. Denmead*, 56 U.S. (15 How.) 330, 343 (1854); *Sewall v. Jones*, 91 U.S. 171, 184 (1875); *Sanitary Refrigerator Co. v. Winters*, 280 U.S. 30, 41-42 (1929). Often the Supreme Court noted that an accused product or process, to avoid infringement under the doctrine, must include "substantial and not merely colorable" differences

from the patent claims. *Singer Mfg. Co. v. Cramer*, 192 U.S. 265, 286 (1904); see also *McCormick v. Talcott*, 61 U.S. (20 How.) 402, 405 (1858); *Duff v. Sterling Pump Co.*, 107 U.S. 636, 639 (1883).

The Supreme Court mapped the modern contours of the doctrine of equivalents in its landmark *Graver Tank* decision. *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605 (1950). In *Graver Tank*, the Court addressed whether Graver Tank's use of a particular electric welding flux infringed Linde Company's patent. The patent claimed "essentially a combination of alkaline earth metal silicate and calcium fluoride." *Id.* at 610. Graver Tank's accused flux substituted "silicates of calcium and manganese—the latter not an alkaline earth metal—for silicates of calcium and magnesium." *Id.* Because only exact duplicates literally infringe, *id.* at 607, the Court recognized that infringement depended on the long-standing doctrine of equivalents. *Id.* at 608.

In explaining the bases for the doctrine, the Supreme Court observed that limiting enforcement of exclusive patent rights to literal infringement "would place the inventor at the mercy of verbalism and would be subordinating substance to form." *Graver Tank*, 339 U.S. at 607. Such a limitation, the Court reasoned, might even encourage infringers "to make unimportant and insubstantial changes and substitutions in the patent which, though adding nothing, would be enough . . . [to evade] the reach of law." *Id.*

Based on these predicates, the Supreme Court concluded, the doctrine applies if, and only if, the differences between the claimed and accused products or processes are insubstantial. *Graver Tank*, 339 U.S. at 610. The Court expressed the doctrine in the following terms for the *Graver Tank* case:

The question which thus emerges is whether the substitution of the manganese which is not an alka-

line earth metal for the magnesium which is, under the circumstances of this case, and in view of the technology and prior art, is a change of such substance as to make the doctrine of equivalents inapplicable; or conversely, whether under the circumstances the change was so insubstantial that the trial court's invocation of the doctrine of equivalents was justified.

Id. The Court defined the doctrine of equivalents in terms of the substantiality of the differences between the claimed and accused products or processes. The Supreme Court in *Graver Tank* thus made insubstantial differences the necessary predicate for infringement under the doctrine of equivalents.

In recent decisions, this court has also stressed the significance of this "insubstantial differences" standard. *Valmont Indus., Inc. v. Reinke Mfg. Co.*, 983 F.2d 1039, 1043, 25 USPQ2d 1451, 1454 (Fed. Cir. 1993); *Charles Greiner & Co. v. Mari-Med Mfg., Inc.*, 962 F.2d 1031, 1036, 22 USPQ2d 1526, 1529 (Fed. Cir. 1992); *London v. Carson Pirie Scott & Co.*, 946 F.2d 1534, 1538, 20 USPQ2d 1456, 1458 (Fed. Cir. 1991); *Slimfold Mfg. Co. v. Kinkead Indus., Inc.*, 932 F.2d 1453, 1457 18 USPQ2d 1842, 1846 (Fed. Cir. 1991); *Moleculon Research Corp. v. CBS, Inc.*, 872 F.2d 407, 409, 10 USPQ2d 1390, 1392 (Fed. Cir. 1989); *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931, 935, 4 USPQ2d 1737, 1739 (Fed. Cir. 1987) (*en banc*), *cert. denied*, 485 U.S. 961, and *cert. denied*, 485 U.S. 1009 (1988); *Perkin-Elmer Corp. v. Westinghouse Elec. Corp.*, 822 F.2d 1528, 1532, 3 USPQ2d 1321, 1324 (Fed. Cir. 1987). In many of these cases, this court also relied on the so-called triple identity, or function-way-result, test to measure the substantiality of the differences. *Valmont*, 983 F.2d at 1043; *London*, 946 F.2d at 1538; *Slimfold*, 932 F.2d at 1457; *Moleculon*, 872 F.2d at 410; *Pennwalt*, 833 F.2d at 934-35. With

this case, this court explicitly holds that the application of the doctrine of equivalents rests on the substantiality of the differences between the claimed and accused products or processes, assessed according to an objective standard.

II.

In applying the doctrine of equivalents, it is often enough to assess whether the claimed and accused products or processes include substantially the same function, way, and result. Courts recognized this principle as early as 1817, when Justice Bushrod Washington, riding circuit, instructed a jury that "[w]here the [claimed and accused] machines are substantially the same, and operate in the same manner, to produce the same result, they must be in principle the same." *Gray v. James*, 10 F. Cas. 1015, 1016 (C.C.D. Pa. 1817) (No. 5,718); *see also Sanitary Refrigerator*, 280 U.S. at 42 ("[G]enerally speaking, one device is an infringement of another 'if it performs substantially the same function in substantially the same way to obtain the same result.' . . . [The patent claim] is nevertheless infringed by a device in which there is no substantial departure from the description in the patent, but a mere colorable departure therefrom.") (quoting *Machine Co. v. Murphy*, 97 U.S. 120, 125 (1877)) (emphasis added). Because examination of function, way, and result often discloses the substantiality of the differences between the accused and claimed products or processes, many courts, including the Supreme Court itself, have used this formulation to describe the doctrine of equivalents. *See, e.g., Graver Tank*, 339 U.S. at 608 (quoting *Sanitary Refrigerator*, 280 U.S. at 42); *Machine Co. v. Murphy*, 97 U.S. at 125.

It goes too far, however, to describe the function-way-result test as "the" test for equivalency announced by *Graver Tank*. The function-way-result test often suffices to assess equivalency because similarity of function, way,

and result leaves little room for doubt that only insubstantial differences distinguish the accused product or process from the claims. But evaluation of function, way, and result does not necessarily end the inquiry. Indeed, the Supreme Court explained that the function-way-result test arose in an era characterized by relatively simple mechanical technology. *Graver Tank*, 339 U.S. at 609 (reciting history of doctrine). As technology becomes more sophisticated, and the innovative process more complex, the function-way-result test may not invariably suffice to show the substantiality of the differences.

Thus evidence beyond function, way, and result is also relevant to the doctrine of equivalents. In *Graver Tank*, the Supreme Court identified and relied on factors in addition to similarity of function, way, and result. The Court considered that persons reasonably skilled in the art knew that the manganese in the accused flux was interchangeable for the magnesium in the claimed flux. 339 U.S. at 609, 612. The Court also permitted the fact-finder to infer infringing "imitation" from the lack of evidence that the accused infringer independently developed its flux. *Id.* at 612.

The Supreme Court's reliance in *Graver Tank* on factors other than function, way, and result endorses consideration of all evidence relevant to the substantiality of the differences. Because "[e]quivalence, in the patent law, is not the prisoner of a formula," *id.* at 609, the available relevant evidence may vary from case to case. When a trial record presents only evidence of function, way, and result, then application of the doctrine will necessarily rest on function, way, and result alone. When a record presents other evidence relevant to the substantiality of the differences, however, the fact-finder must consider it.

In either event, the vantage point of one of ordinary skill in the relevant art provides the perspective for assessing the substantiality of the differences. *Valmont*, 983 F.2d at 1043. The test is objective, with proof of the sub-

stantiality of the differences resting on objective evidence rather than unexplained subjective conclusions, whether offered by an expert witness or otherwise.

According to the Supreme Court, "[a]n important factor" to be considered, quite apart from function, way, and result, "is whether persons reasonably skilled in the art would have known of the interchangeability of an ingredient not contained in the patent with one that was." *Graver Tank*, 339 U.S. at 609. The precedent of this court has also stressed the importance of evidence of known interchangeability to show infringement under the doctrine. See *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1261, 9 USPQ2d 1962, 1969 (Fed. Cir. 1989); *Thomas & Betts Corp. v. Litton Sys., Inc.*, 720 F.2d 1572, 1579, 220 USPQ 1, 6 (Fed. Cir. 1983). The known interchangeability of the accused and claimed elements is potent evidence that one of ordinary skill in the relevant art would have considered the change insubstantial. Without such evidence, the patentee will need other objective technological evidence demonstrating that the substitute nevertheless represents a change that the ordinary artisan would have considered insubstantial at the time of infringement.

Evidence of copying is also relevant to infringement under the doctrine of equivalents, see *Graver Tank*, 339 U.S. at 612, not because the doctrine of equivalents rests on the subjective awareness or motivation of the accused infringer, but rather because copying suggests that the differences between the claimed and accused products or processes—measured objectively—are insubstantial. When an attempt to copy occurs, the fact-finder may infer that the copyist, presumably one of some skill in the art, has made a fair copy, with only insubstantial changes. Such an inference, of course, would not dominate the doctrine of equivalents analysis. Instead, where the inference arises, it must be weighed together with the other evidence relevant to the substantiality of the differences.

By considering evidence of copying, however, the Supreme Court did not imply that infringement under the doctrine requires bad faith or some other subjective component. Intent is not an element of infringement. See, e.g., *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 478 (1974). A patent owner may exclude others from practicing the claimed invention, regardless of whether infringers even know of the patent:

This question [of infringement] is one irrespective of motive. The defendant may have infringed without intending, or even knowing it; but he is not, on that account, the less an infringer. His motives and knowledge may affect the question of damages, to swell or reduce them; but the immediate question is the simple one, has he infringed?

Parker v. Hulme, 18 F. Cas. 1138, 1143 (C.C.E.D. Pa. 1849) (No. 10,740); see also *Kewanee*, 416 U.S. at 478; *Intel Corp. v. United States Int'l Trade Comm'n*, 946 F.2d 821, 832, 20 USPQ2d 1161, 1171 (Fed. Cir. 1991). The Supreme Court, in the exegesis of the doctrine in *Graver Tank*, notably does not mention a threshold showing of bad faith or evil intent. Proof of bad faith by an infringer may entitle the patent owner to enhanced damages and attorney fees for willful infringement under 35 U.S.C. §§ 284-285 (1988). Evidence of culpable conduct, however, is not a prerequisite nor necessary for application of the doctrine.

The Supreme Court applied the doctrine of equivalents in *Graver Tank* to prevent "fraud on a patent," 339 U.S. at 608, not fraud by the accused infringer. As *Graver Tank* demonstrates, preventing "fraud on a patent" involves an objective assessment of the substantiality of the differences between the claimed and accused products or processes. The doctrine of equivalents does not rely on the subjective awareness or intent of the accused infringer. While the doctrine discourages the "unscrupulous copyist,"

339 U.S. at 607, its reach is not so limited. Thus, lack of substantial differences, not the accused infringer's motives or intent, triggers application of the doctrine of equivalents.

Evidence of "designing around" the patent claims is also relevant to the question of infringement under the doctrine. The ability of the public successfully to design around—to use the patent disclosure to design a product or process that does not infringe, but like the claimed invention, is an improvement over the prior art—is one of the important public benefits that justify awarding the patent owner exclusive rights to his invention. Designing around "is the stuff of which competition is made and is supposed to benefit the consumer." *State Indus., Inc. v. A.O. Smith Corp.*, 751 F.2d 1226, 1236, 224 USPQ 418, 424 (Fed. Cir. 1985). When a competitor becomes aware of a patent, and attempts to design around its claims, the fact-finder may infer that the competitor, presumably one of skill in the art, has designed substantial changes into the new product to avoid infringement. Again, the strength of this inference may vary from case to case. Evidence of designing around therefore weighs against finding infringement under the doctrine of equivalents.

Evidence that the accused infringer developed its product or process through independent research is not directly relevant to the question of infringement under the doctrine of equivalents. Independent development is not designing around. Independent development means that the accused infringer had no knowledge of the patented invention when it developed its product or process. Without knowledge, the independent developer could not have set out to make its product or process either similar to or different from the claimed invention. Unlike copying or designing around, therefore, independent development itself provides no information about the substantiality of the differences. Furthermore, because intent is not an element of infringement, independent development does not excuse infringe-

ment of the patent owner's right to exclude. See *Parker v. Hulme*, 18 F. Cas. at 1143. An independently developed product or process that falls within the patent claims or includes only insubstantial differences nevertheless infringes. See *Kewanee*, 416 U.S. at 478. In sum, those who make only insubstantial changes to a patented product or process are liable for infringement, regardless of their awareness of the patent and its disclosure.

Evidence of independent development is highly relevant, however, to refute a patent owner's contention that the doctrine of equivalents applies because the accused infringer copied, that is, intentionally appropriated the substance of the claimed invention. In *Graver Tank*, the Supreme Court linked the fact-finder's inference of copying to independent research. 339 U.S. at 612. Because the record lacked evidence of independent development, the fact-finder could infer copying or "imitation." *Id.* When the patent owner asserts copying, evidence that the accused infringer developed its product or process without knowing of the patent becomes relevant in rebuttal. For this reason, the fact-finder must consider any evidence of independent development in a case where the patent owner alleges copying as probative of infringement under the doctrine of equivalents.

III.

Infringement, whether literal or under the doctrine of equivalents, is a question of fact. *Winans v. Denmead*, 56 U.S. (15 How.) at 338; *SRI Int'l v. Matsushita Elec. Corp.*, 775 F.2d 1107, 1125, 227 USPQ 577, 589 (Fed. Cir. 1985) (*en banc*). The Supreme Court made this abundantly clear in *Graver Tank*:

A finding of equivalence is a determination of fact. Proof can be made in any form: through testimony of experts or others versed in the technology; by documents, including texts and treatises; and, of course, by the disclosures of the prior art. Like any other

issue of fact, final determination requires a balancing of credibility, persuasiveness, and weight of evidence. [When tried to the trial court, it] is to be decided by the trial court and that court's decision, under general principles of appellate review, should not be disturbed unless clearly erroneous. Particularly is this so in a field where so much depends upon familiarity with specific scientific problems and principles not usually contained in the general storehouse of knowledge and experience.

339 U.S. at 609-10. The Supreme Court thus reemphasized that infringement under the doctrine of equivalents is an issue of fact. When infringement is tried to the court, as in *Graver Tank*, an appellate court reviews the trial court's infringement finding for clear error. When tried to a jury, an appellate court reviews the jury verdict for lack of substantial evidence. See, e.g., *Genentech, Inc. v. Wellcome Found., Ltd.*, 29 F.3d 1555, 1565, 31 USPQ2d 1161, 1168-69 (Fed. Cir. 1984).

In several recent opinions, this court has referred to the doctrine of equivalents as "equitable."² The term "equita-

² See *Valmont Indus., Inc. v. Reinke Mfg. Co.*, 983 F.2d 1039, 1043 n.1, 25 USPQ2d 1451, 1454 n.1 (Fed. Cir. 1993) ("the doctrine 'is designed to do equity [but] it is not designed . . . to permit a claim expansion that would encompass more than an insubstantial change'") (quoting *Perkin-Elmer Corp. v. Westinghouse Elec. Corp.*, 822 F.2d 1528, 1532, 3 USPQ2d 1321, 1324 (Fed. Cir. 1987)); *Texas Instruments Inc. v. United States Int'l Trade Comm'n*, 988 F.2d 1165, 1173, 26 USPQ2d 1018, 1024 (Fed. Cir. 1993) ("the doctrine of equivalents has been 'judicially devised to do equity'") (quoting *Loctite Corp. v. Ultraseal, Ltd.*, 781 F.2d 861, 870, 228 USPQ 90, 96 (Fed. Cir. 1985)); *Charles Greiner & Co. v. Mari-Med Mfg., Inc.*, 962 F.2d 1031, 1036, 22 USPQ2d 1526, 1529 (Fed. Cir. 1992) ("careful confinement of the doctrine of equivalents to its proper equitable role . . . promotes certainty and clarity in determining the scope of patent rights"); *London v. Carson Pirie Scott & Co.*, 946 F.2d 1534, 1538, 20 USPQ2d 1456, 1458 (Fed. Cir. 1991) ("this equitable doctrine evolved from a balancing of competing policies").

ble" can have many meanings. The Supreme Court explained in *Graver Tank* that the doctrine prevents the unfairness of depriving the patent owner of effective protection of its invention, 339 U.S. at 607, thereby achieving a fair or "equitable" result. Thus, in doctrine of equivalents cases, this court's allusions to equity invoke equity in its broadest sense—equity as general fairness. While recognizing the equity, or fairness, promoted by the doctrine of equivalents, furthermore, the Supreme Court stated unequivocally that application of the doctrine is a question of fact. *Id.* at 609. This court has followed. *SRI*, 775 F.2d at 1118 ("It is settled that the question of infringement (literal or by equivalents) is factual. *Graver Tank*.").

By referring to the doctrine as a doctrine of fairness, neither the Supreme Court nor this court has invoked the myriad implications of an alternative to legal remedies. In addition, neither the Supreme Court nor this court has invoked equity in the technical sense of a set of principles originating in England to compensate for the historically harsh rules of common law. *Graver Tank* does not discuss any of the principles commonly attending the chancellor's invocation of equitable power, such as the "clean hands" doctrine, the elevated burden of proof, the abuse of discretion standard of review, or the mandatory balancing of the equities. Indeed, the Supreme Court has more than once stated that every patent owner is entitled to invoke the doctrine of equivalents—a proposition inimical to the hypothesis that the doctrine is equitable. See *Sanitary Refrigerator*, 280 U.S. at 42; *Seymour v. Osborne*, 78 U.S. (11 Wall.) 516, 556 (1871) ("Patentees . . . are entitled in all cases to invoke to some extent the doctrine of equivalents . . ."). Moreover, the Supreme Court in *Graver Tank* credited the origin of the doctrine of equivalents to its own decision in *Winans v. Denmead*—a case at law, not equity. See *Graver Tank*, 339 U.S. at 608; *Winans v. Denmead*, 56 U.S. (15 How.) at 338. Therefore, by its terms, *Graver Tank* did not impliedly

transform a legal basis for recovery into an equitable one. In short, the Supreme Court's cases on the doctrine of equivalents foreclose a holding that the doctrine is a matter of equity to be applied at the court's discretion.

IV.

In answer to the first question posed by this court *en banc*, a finding of infringement under the doctrine of equivalents requires proof of insubstantial differences between the claimed and accused products or processes. Often the function-way-result test will suffice to show the extent of the differences. In such cases, the parties will understandably focus on the evidence of function, way, and result, and the fact-finder will apply the doctrine based on that evidence. Other factors, however, such as evidence of copying or designing around, may also inform the test for infringement under the doctrine of equivalents. No judge can anticipate whether such other factors will arise in a given case. Instead, the presence of such factors will depend on the way the parties frame their arguments. Neither the Supreme Court nor this court limits the types of evidence that either party may proffer in support of a factor it considers probative of infringement under the doctrine. The trial judge, however, has a duty to decide whether the proffered evidence is relevant. This duty to assess relevance is no different in a doctrine of equivalents case than in any other type of case. Relevance will be self-evident to the judge in a case tried to the bench. In a jury trial, however, the judge must admit only relevant evidence, and instruct the jury to consider only the admitted evidence in reaching its decision.

In answer to the second question posed by this court *en banc*, infringement under the doctrine of equivalents is an issue of fact to be submitted to the jury in a jury trial with proper instructions, and to be decided by the judge in a bench trial. The answer to the third question posed by this court *en banc* necessarily flows from the answer to

the second question. The trial judge does not have discretion to choose whether to apply the doctrine of equivalents when the record shows no literal infringement.

V.

This court reviews a jury verdict on the fact question of infringement under the doctrine of equivalents for prejudicial error in the jury instructions, *Biodex Corp. v. Loredan Biomedical, Inc.*, 946 F.2d 850, 854, 20 USPQ 2d 1252, 1254 (Fed. Cir. 1991), *cert. denied*, 112 S. Ct. 2957 (1992), and lack of substantial evidence supporting the verdict, *see Genentech*, 29 F.3d at 1565.

While jury instructions must correctly state the law, they need only be sufficiently comprehensive to address the issues of material fact raised by the record evidence. *Biodex*, 946 F.2d at 854. Indeed, "[j]ury instructions must be confined to the issues as presented by the pleadings and evidence." *American Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1363, 220 USPQ 763, 773 (Fed. Cir.), *cert. denied*, 469 U.S. 821 (1984).

The sufficiency of jury instructions is not tested in a vacuum. "It is well established that [each] instruction 'may not be judged in artificial isolation,' but must be considered in the context of the . . . trial record." *Estelle v. McGuire*, 502 U.S. 62, 72 (1991) (quoting *Cupp v. Naughten*, 414 U.S. 141, 147 (1973)); *see also Biodex*, 946 F.2d at 862. The words of the instructions take on meaning from the context of what happened at trial, including how the parties tried the case and their arguments to the jury. Accordingly, we must examine the trial context in which the jury instructions were given by the trial court.

Hilton Davis offered evidence of and argued function, way, and result in asserting the doctrine of equivalents. Warner-Jenkinson responded in kind. Warner-Jenkinson also offered evidence of independent development, contend-

ing repeatedly that its lack of knowledge of the '746 patent when it developed its ultrafiltration process excused it from infringement under the doctrine. In its appeal brief, Warner-Jenkinson summarized its interpretation of the doctrine of equivalents:

[The doctrine of equivalents] is an equitable remedy available only upon a suitable showing of the equities. To demonstrate that the equities favor application of the doctrine, the patentee must put forth proof of the equities, and the trial court must find the type of conduct which triggers its application. *London v. Carson Pirie Scott & Co.*, [946 F.2d 1534, 1538, 20 USPQ2d 1456, 1458 (Fed. Cir. 1991)]; *Charles Greiner & Co. v. Mari-Med Mfg. Inc.*, 962 F.2d 1031, 1035-36, 22 [USPQ2d] 1526, 1529 (Fed. Cir. 1992). As an equitable remedy, the doctrine is an issue of law for the court, not the jury.

B. Here, no equitable basis exists for the application of the doctrine. Warner-Jenkinson's processes were developed in cooperation with knowledgeable and experienced vendors in the field including Osmonics There was no copying or piracy.

As noted, however, the doctrine of equivalents is not an equitable remedy available only on a showing of the equities. Lack of awareness of the patent or its disclosure does not excuse infringement. *Parker v. Hulme*, 18 F. Cas. at 1143. Accordingly, Warner-Jenkinson could not succeed in erecting an equitable defense to infringement.

In this context, the trial court instructed the jury about the doctrine of equivalents in terms of function, way, and result:

You may find infringement under the doctrine of equivalents when the accused process and the claimed invention perform substantially the same function in substantially the same way to yield substantially the

same result even though the processes differ in name, form or shape.

(Emphasis added.) This formulation correctly stated that the jury "may" rely on the function-way-result test, recognizing that this test is often enough to show infringement under the doctrine. In particular, the trial court tailored its function-way-result instruction to the parties reliance on evidence of function, way, and result in this case.

Moreover, the trial court's instructions correctly resisted Warner-Jenkinson's effort to erect an equitable threshold for application of the doctrine of equivalents. The doctrine of equivalents has no equitable or subjective component. The cases Warner-Jenkinson cites to the contrary—*London*, 946 F.2d at 1538, and *Charles Greiner*, 962 F.2d at 1035-36—reaffirm that the *Graver Tank* objective criteria, as limited by prosecution history and prior art, confine the range of equivalents. These cases do not condition effective patent protection on proof of bad faith. Accidental or "innocent" infringement is still infringement. Intent becomes a requirement only if and when the patent owner seeks enhanced damages or attorney fees for willful infringement under 35 U.S.C. §§ 284-285. In this case, for example, the jury took Warner-Jenkinson's lack of intent into account when it found that Warner-Jenkinson did not willfully infringe. Therefore, under the trial court's instructions, Warner-Jenkinson's evidence of independent development played its proper role: it shielded Warner-Jenkinson from an enhanced damages award, but did not provide a basis for avoiding application of the doctrine. The evidence of independent development in this case, directed as it is only to the issue of whether the accused infringer acted with knowledge of the patent, is irrelevant to showing substantial differences. This court cannot fault the absence of any reference to such evidence in the jury instructions.

Under these circumstances, the trial court's function-way-result instruction correctly guided the jury to consider the relevant evidence. In a perfect world, the trial court might have provided further guidance—by instructing the jury, for instance, that Warner-Jenkinson's independent development was not an excuse to infringement. Nonetheless, the trial court's function-way-result instruction directed the jury to consider, in assessing infringement, the only evidence relevant to the substantiality of the differences that was offered at trial. Significantly, Warner-Jenkinson did not object to this instruction. Rather, Warner-Jenkinson objected to sending the doctrine of equivalents question to the jury at all, contending that independent development excused it from infringing.

The trial context left the jury to consider the evidence of function, way, and result presented by both parties, the only available evidence going to the substantiality of the differences. In the context of this trial, the instructions properly focused the jury on the evidence relevant to the doctrine of equivalents.⁸

⁸ The closing arguments underscore that the jury properly focused on insubstantial differences in applying the doctrine of equivalents. Counsel for Hilton Davis extensively explained the doctrine to the jury in terms of insubstantial differences:

What you are going to hear, what you are going to hear Judge Weber tell you is he's going to tell you about the law of the doctrine of equivalents. Is one thing equivalent to another for purposes of patent infringement. And what he's going to read to you the law is, is that the doctrine of equivalents exists to prevent a fraud on the patent. It exists to keep people from tickling the patent, from making a tiny change that doesn't make any difference at all and then trying to convince people that there really is a difference there.

...

... So does the acid really make any difference in this process? There is not a nickel's worth of difference.

...

... So does it really make any difference? We saw from Dr. Cook's notebooks of all the tests they did there were pHs all over the place, from 2 all the way up to 8, and they adjusted

When a jury makes a finding on infringement under the doctrine of equivalents, this court will uphold that finding

these intentionally to see what would happen, and it didn't make a nickel's worth of difference. The process kept running along processing the dye.

....

So, tickling the patent, cosmetic changes that don't mean a nickel's worth of difference to what Hilton Davis' patent had.

....

What he is really meaning is Warner-Jenkinson got caught and now they are trying to come up with some excuses to argue their way out of it. It is different, it is different, it is different, but there is no difference at all. Thank you, ladies and gentlemen.

(Emphasis added.) Counsel for Warner-Jenkinson relied on the differences in function, way, and result between the claimed and accused processes and on its independent development:

In any event, what else do they do? pH. *They try to tell you that pH doesn't matter. This is interesting the way they did this. Here's what Mr. Schmit asked Mr. Cook on direct examination. Question, "In terms of whether or not the process will work to separate the dye from the impurities, does it make a difference what pH you operate at?["] There is Mr. Cook's answer. "Not to my knowledge." Okay. And Mr. Kinman told you, "Not to my knowledge, pH doesn't make a difference." And why did they tell you that? They tell you that because they want you to think that our pH of 5 doesn't really make a difference; therefore, we are doing substantially the same thing they are doing. . . .*

....

So this doctrine of equivalents, the reason I'm spending so much time on it is that it had a special purpose in the law and it is to get somebody where they see someone's patent and they say, "Gee, that's a great idea." Now, *let's just change this little thing and that little thing and they are outside the literal terms of the patent. That's an unscrupulous infringer. That's your fraud on the patent office.* The person who does that. It is not the person who develops their own thing, who does their own thing for their own reasons and because they have their own processes. . . .

(Emphasis added.) Thus, the jury received the case with emphasis on the substantiality of the differences supplied in closing argu-

if supported by substantial evidence. *Genentech*, 29 F.3d at 1565. "It is not for this Court to even essay an independent evaluation of this evidence. This is the function of the trial court." *Graver Tank*, 339 U.S. at 611. Thus, the next question is the sufficiency of the evidence to support the jury verdict.

The '746 claims recite a pH "from approximately 6.0 to 9.0." Warner-Jenkinson at times used a lower pH of 5.0. The claims also recite a pressure of "approximately 200 to 400 p.s.i.g." Warner-Jenkinson used a pressure somewhere in a range of 200 to nearly 500 p.s.i.g.

Substantial evidence supports the jury finding that Warner-Jenkinson's pH variation from the claimed approximate range was insubstantial. The claimed pH limitation prevents damage to the membrane and produces a neutral final dye product. Dr. Cook, one of the inventors, testified that a pH of 5 would have the same effect as a pH of 6, as would any pH above 2. Even Warner-Jenkinson's expert agreed that Hilton Davis' process would operate at a pH of 5. The record contains substantial evidence that one of skill in the art would know that performing ultrafiltration at a pH of 5 would allow the membrane to perform the same function, in an equivalent way, to achieve the same result as at a pH of approximately 6 to 9.

Substantial evidence also supports the jury finding that Warner-Jenkinson's pressure for some of its membranes was in the claimed range of approximately 200 to 400 p.s.i.g. Warner-Jenkinson argues for pressure measurement at the high pressure pump instead of at the membrane. Warner-Jenkinson's pressure at the high pressure pump may have been as high as nearly 500 p.s.i.g. The specification, however, defines the pressure as "applied to the upstream side of the membrane." The '746 patent, col. 6, lines 20-21. In any event, the record contains sub-

ments and focus on the function-way-result test supplied by jury instructions.

stantial evidence that Warner-Jenkinson's pressure performed the same function—forcing the solution through the membrane—in an equivalent way, to achieve the same result.

As for pore size, the trial record details the difficulty of measuring a membrane's exact pore size in light of variations in fluid and pressure conditions. The record contains considerable evidence, however, about the pore size necessary to separate dye molecules from smaller molecular impurities. The record thus includes substantial evidence that Warner-Jenkinson necessarily used membranes of the claimed "nominal pore diameter of 5 to 15 Angstroms" to accomplish ultrafiltration.

Nor does prosecution history estoppel preclude application of the doctrine of equivalents in this case. "Whenever prosecution history estoppel is invoked as a limitation to infringement under the doctrine of equivalents, 'a close examination must be made as to, not only what was surrendered, but also the reason for such a surrender.'" *Insta-Foam Prods., Inc. v. Universal Foam Sys., Inc.*, 906 F.2d 698, 703, 15 USPQ2d 1295, 1298 (Fed. Cir. 1990) (quoting *Bayer AG v. Duphar Int'l Research B.V.*, 738 F.2d 1237, 1243, 222 USPQ 649, 653 (Fed. Cir. 1984)). The inventors amended the '746 claims to recite "a pH from approximately 6.0 to 9.0" to avoid the disclosure in the Booth patent of an ultrafiltration process operating at a pH higher than 9. This amendment surrendered pHs above 9, but does not bar Hilton Davis from asserting equivalency to processes such as Warner-Jenkinson's operating sometimes at a pH below 6.

Warner-Jenkinson performed the process disclosed in the '746 patent—purifying dye by collecting relatively large dye molecules on the concentrate side of a membrane. Warner-Jenkinson did not use precisely the claimed process parameters, but the jury found the differences between Warner-Jenkinson's and the claimed processes insubstantial. The record contains substantial evidence support-

ing this finding of infringement under the doctrine of equivalents.

VI.

While agreeing that the substantiality of the differences between the claimed and accused products or processes is the ultimate question under the doctrine of equivalents, one dissent contends that "[t]he authority to exercise the unique remedy which is the doctrine of equivalents lies exclusively in courts of equity." This dissent argues that, because the Patent Act of 1952 does not expressly provide a general remedy for infringement under the doctrine of equivalents, the doctrine must be, like other judge-created extensions of inadequate legal remedies, purely equitable. This reasoning, however, is a sharp departure from a century of Supreme Court decisions issued under a stable statutory regime.

The Supreme Court has long held that the question of infringement, whether literal or by equivalents, is a question of fact for the jury if properly demanded. For example, in *Coupe v. Royer*, 155 U.S. 565 (1895), the Court faced an accused infringer's contention that the trial court had improperly instructed the jury to the plaintiff's advantage regarding the question of infringement under the doctrine of equivalents. Remanding the case for a new trial, the Court held that, despite the lack of a genuine issue of fact regarding either the proper construction of the patent claim or the nature of the accused device, the question of infringement under the doctrine presented a question requiring trial to the jury. *Id.* at 579-80. In so holding, the Court merely followed its decision in *Winans v. Denmead*: "whether, in point of fact, the defendant's [devices] did copy the plaintiff's invention, in the sense above explained [*i.e.*, by an equivalent], is a question for the jury." *Winans v. Denmead*, 56 U.S. (15 How.) at 344. Citations for this principle can, of course, be multiplied. See, *e.g.*, *Royer v. Schultz Belting Co.*, 135 U.S. 319, 325 (1890); *Tyler v. Boston*, 74 U.S. (7 Wall.) 327, 330-31 (1869).

This dissent also contends that the claiming requirement compels limiting the doctrine of equivalents by equitable principles. The claiming requirement, however, was contained in the Patent Act of 1870, eighty years before *Graver Tank*. See Patent Act of 1870, ch. 230, § 26, 16 Stat. 198, 201 (“[B]efore any inventor or discover shall receive a patent . . . he shall particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery”); see also Patent Act of 1836, ch. 357, § 6, 5 Stat. 117, 119 (requiring inventor to “particularly specify and point out the part . . . which he claims”). Moreover the Supreme Court in *Graver Tank* reached its decision over Justice Black’s dissent which also invoked the statutory claiming requirement against application of the doctrine. See *Graver Tank*, 339 U.S. at 613-14 (Black, J., dissenting).

The Supreme Court explained that the doctrine is not inconsistent with the requirement for explicit claims. According to *Graver Tank*, the “theory on which [the doctrine of equivalents] is founded is that ‘if two devices do the same work in substantially the same way, and accomplish substantially the same result, *they are the same*, even though they differ in name, form, or shape.’” 339 U.S. at 608 (quoting *Machine Co. v. Murphy*, 97 U.S. at 125) (emphasis added); see also *Sanitary Refrigerator*, 280 U.S. at 41-42 (“There is a substantial identity, constituting infringement, where a device is a copy of the thing described by the patentee, ‘either without variation, or with such variations as are consistent with its being in substance the same thing.’”; quoting *Burr v. Duryee*, 68 U.S. (1 Wall.) 531, 573 (1864)); *Machine Co. v. Murphy*, 97 U.S. at 125 (“Authorities concur that the substantial equivalent of a thing, in the sense of the patent law, is the same as the thing itself”). In other words, equivalency, like exact copying, gives rise to infringement liability *because* it too is a relationship of identity, a proposition quite consistent with the requirement that the patent claim “particularly point out” and thereby circum-

scribe the protected invention. See, e.g., 3 William C. Robinson, *The Law of Patents for Useful Inventions* § 894 (1890) (discussing the identity theory underlying infringement by equivalents). In addition, by citing *Machine Co. v. Murphy* for the concept of identity that undergirds infringement by equivalents, the Court in *Graver Tank*, decided eighty years *after* the advent of peripheral claiming, relied on a case involving a patent granted in 1859, 97 U.S. at 121, eleven years *before* the advent of peripheral claiming. Because the statutory definition of infringement has, as will be demonstrated below, remained virtually unchanged since 1790, the Court could rely on this pre-1870 case for the doctrine of equivalents. The dissent’s equity model—and its underlying premise that the advent of peripheral claiming in the Patent Act of 1870 dramatically altered the legitimacy or basis of the doctrine of equivalents—would leave the Court’s reliance on *Machine Co. v. Murphy* in *Graver Tank* utterly inexplicable.

The dissent also suggests that Congress could have, but has not, included the doctrine of equivalents in the Patent Act of 1952, 35 U.S.C. §§ 1-376 (1988 & Supp. V 1993). According to this dissent, “[i]f Congress wanted to provide for [infringement by] equivalents to what is claimed, it knew how to do it.” This argument suffers at least three fatal flaws. First, the statutory definition of infringement, which appears in 35 U.S.C. § 271(a), makes no reference to claims at all. Thus, the definition of infringement is at best equivocal on the question of infringement under the doctrine of equivalents. Second, the Supreme Court itself has noted that “§ 271(a) of the new Patent Code [of 1952], which defines ‘infringement,’ left intact *the entire body of case law on direct infringement.*” *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 342 (1961) (emphasis added). Thus, contrary to the dissent’s inference that the Patent Act of 1952’s silence repealed *Graver Tank* and its forebears, the Supreme

Court in *Aro* states that section 271(a) left intact the doctrine of equivalents.

Third, and perhaps most importantly, infringement was defined and understood long before 1952. According to section 4 of the Patent Act of 1790, anyone who without authority "devise[d], ma[d]e, construct[ed], use[d], employed[ed], or vend[ed]" a patented invention was liable to the patentee for "such damages as shall be assessed by a jury." Patent Act of 1790, § 4, 1 Stat. at 111. Similarly, according to section 5 of the Patent Act of 1793, anyone who "ma[d]e, devise[d] and use[d], or s[old]" a patented invention was liable to the patentee for a sum "at least equal to three times the price, for which the patentee has usually sold or licensed to other persons, the use of said invention," a liability to be adjudicated in a legal, not equitable, "action on the case." Patent Act of 1793, ch. 11, § 5, 1 Stat. 318, 322. Section 14 of the Patent Act of 1836 simply provided for a legal "action for damages for making, using, or selling" a patented invention without authority. Patent Act of 1836, § 14, 5 Stat. at 123. Finally, section 59 of the Patent Act of 1870 simply provided "that damages for the infringement of any patent may be recovered by action on the case." Patent Act of 1870, § 59, 16 Stat. at 207. Against this stable backdrop of statutory definitions of infringement, definitions which are virtually indistinguishable from the current 35 U.S.C. § 271(a), the Supreme Court has recognized actions at law for recovery for infringement under the doctrine of equivalents since its *Winans v. Denmead* decision in 1854. In light of this authority, this court detects no basis to hold that the doctrine of equivalents was rendered extrastatutory and thus equitable by virtue of the silent repeal that the dissent finds in the Patent Act of 1952.

A separate dissent concurs in our conclusion that the function-way-result test is not "the" test for equivalents.

This dissent, however, would prefer to treat the substantiality of the differences as "only one of the factors according to *Graver*, arguably the most important factor, which a court should consider in deciding whether to apply the" doctrine of equivalents. The Supreme Court, in our view, made the fundamental question "whether under the circumstances the change [in the accused product or process] was so insubstantial that . . . invocation of the doctrine of equivalents [is] justified." *Graver Tank*, 339 U.S. at 610.

In addition, this separate dissent argues that the accused infringer's intent is relevant to the question whether the accused product or process infringes under the doctrine. As clarified above, however, intent is not an element of direct infringement, whether literal or by equivalents. Neither *Graver Tank* nor any other authority supports the proposition that preventing "fraud on a patent," 339 U.S. at 608, turns on the subjective awareness or intent of the accused infringer. Moreover, neither evidence of copying, independent development, not "designing around" owes its relevance in a doctrine of equivalents analysis to the state of mind of the accused infringer. Infringement is, and should remain, a strict liability offense.

Finally, this dissent departs from our basic disposition of the case, arguing that our basic holding as to the status of the function-way-result test renders the trial court's instructions in this case plainly erroneous. As has been demonstrated, however, the trial court's instructions were sufficiently comprehensive to direct the jury to consider, in assessing infringement under the doctrine of equivalents, the only evidence relevant to the substantiality of the differences that the parties offered. No more is required. See *Biodex*, 946 F.2d at 853-54.

A third dissent contends that "because we know what the claim means and we know what process parameters Warner-Jenkinson uses, the issue of infringement under the

doctrine [of equivalents] . . . resolves itself into one of law," reviewable *de novo* on appeal. The Supreme Court squarely renounced arrogation of the fact-finding function in *Graver Tank*, however, recognizing that an appellate court is *not* best qualified to assess the facts in a doctrine of equivalents case:

A finding of equivalence is one of fact. . . . Like any other issue of fact, final determination requires a balancing of credibility, persuasiveness and weight of evidence. It is to be decided by the trial court [in a bench trial] and that court's decision, under general principles of appellate review, should not be disturbed unless clearly erroneous. *Particularly is this so in a field where so much depends upon familiarity with specific scientific problems and principles not usually contained in the general storehouse of knowledge and experience.*

Graver Tank, 339 U.S. at 609-10 (emphasis added). In short, the Supreme Court settled the question of the standard of review in doctrine of equivalents cases, foreclosing the dissent's contention.

This dissent also argues for adoption of a new "legal limitation" on the doctrine of equivalents prohibiting "enlargement of the claim." The rule against enlargement of claim scope during claim construction is well settled. *See, e.g., Keystone Bridge Co. v. Phoenix Iron Co.*, 95 U.S. 274, 278-79 (1877). This dissent errs, however, in arguing that application of the doctrine of equivalents enlarges the claim scope. Instead the doctrine of equivalents provides the same protection to the substance of the claim scope provided by the doctrine of literal infringement. As explained in *Graver Tank*, when there are no substantial differences between the claimed and accused products or processes, "they are the same" in the eyes of the patent law. *Graver Tank*, 339 U.S. at 608 (quoting *Machine Co. v. Murphy*, 97 U.S. at 125). The rule

against enlargement, although an essential tenet of claim construction, thus contributes nothing to the inquiry into infringement under the doctrine.

This dissent also purports to discern in some of the Supreme Court's decisions a second "legal limitation" on the doctrine of equivalents limiting "the range of infringing substitutions to those in which components were substituted which were *known* to be equivalents" when the patent issued. The dissent's analysis is flawed, however. The Court has recognized that post-issuance improvements can infringe under the doctrine. *See Sanitary Refrigerator*, 280 U.S. at 40-43. Our cases have followed the same course. *See, e.g., Moleculon*, 872 F.2d at 409; *Hughes Aircraft Co. v. United States*, 717 F.2d 1351, 1365, 219 USPQ 473, 483 (Fed. Cir. 1983). In *Graver Tank*, furthermore, the Court recognized the ingenuity of would-be pirates, who may always be expected to find new ways to avoid the literal scope of a patent claim:

One who seeks to pirate an invention, like one who seeks to pirate a copyrighted book or play, may be expected to introduce minor variations to conceal and shelter the piracy. Outright and forthright duplication is a dull and very rare form of infringement.

Graver Tank, 339 U.S. at 607. The doctrine "evolved in response to this experience," *id.* at 608, and stands as a bulwark against such "insubstantial changes," *id.* at 607. Limiting the range of potentially infringing substitutions to those known at the time of the patent's issuance would undermine the doctrine, denying patent owners protection of the substance of their inventions against new forms of infringement.

Finally, this third dissent takes issue with the jury's evaluation of the evidence and this court's refusal to apply prosecution history estoppel. *Graver Tank* bound this court only to review the jury's fact findings and not to rely on our independent views. As has been demon-

strated, each of the jury's fact findings is supported by substantial evidence. Therefore this court must affirm the jury's fact findings, regardless of what result this court might have reached had it been entrusted with fact finding at trial. See *Lavender v. Kurn*, 327 U.S. 645, 653 (1946).

As for prosecution history estoppel, as explained, this doctrine turns on the reasons for claim amendments during prosecution. *Insta-Foam*, 906 F.2d at 703. That the '746 inventors amended the claims to recite "a pH from approximately 6.0 to 9.0" to avoid the prior art disclosure of a process operating at a pH higher than 9 does not bar Hilton Davis from asserting equivalency to Warner-Jenkinson's process sometimes operating at a pH below 6.

CONCLUSION

Substantial evidence supports the jury verdict of infringement under the doctrine of equivalents. The judgment of the district court is affirmed.

COSTS

Each party shall bear its own costs.

AFFIRMED

NEWMAN, *Circuit Judge*, concurring.

The doctrine of equivalents has neither greatly excited the centers of legal scholarship, nor seriously stirred action-oriented industry. Indeed, there remains a telling silence on the part of the technology community, for or against. Despite the controversial changes proposed in opinions of this court, there has been little objective policy exploration, economic analysis, legislative proposal, or even a search for consensus. There has, of course, been a good deal of speculation flowing from the inconsistency of our decisions.

The court today holds that no change is appropriate in the common law of equivalency as developed by the Supreme Court. I join in that holding, for our conclusion is in accord with precedent, and this *en banc* decision provides needed repose: the proposed new test of a threshold "equity" determination has been laid to rest, and the criteria of *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 85 USPQ 328 (1950), have been reaffirmed. Indeed, any change in the legal and factual fundamentals so explicitly laid out by the Supreme Court is beyond our judicial authority. I have, however, come to doubt that the doctrine of equivalents is the best way to achieve the result for which it arose, and I encourage the technology-user community to consider whether new procedures, through the legislative process, may better serve the national interest.

Our decision, like every decision of patent principle, affects the national interest in technologic innovation. I have sought to understand how that effect is manifested in the doctrine of equivalents. In so doing I have taken an analytic path not discussed by the court, albeit a path that I believe underlies the common law of equivalency. This path has led me into the thicket of the sociology and economics of patent law, for I have attempted to place the basic question—the role and application of the doc-

trine of equivalents—into the practical context of the purposes and workings of the patent system, as informed by modern scholarship.

The parties and the *amici curiae* did not discuss this public interest aspect, although the consequences of our decision, as for all law, extend beyond those of the parties involved in the specific dispute. It is a consideration of passing complexity, for the mere availability of recourse to the doctrine of equivalents can affect technologic progress as well as commercial relationships, the core of the patent system. Thus I write to explain my decision, and the considerations that influenced it.

Technologic Innovation and the National Interest

Technologic innovation¹ has driven the American economy, over the past century, to the exclusion of virtually all other growth factors. Many students of technologic change have explained that innovative activity is fundamental to industrial vigor, developing new markets while strengthening and enriching the nation. *E.g.*, F.M. Scherer, *Innovation and Growth* (1984); Robert Solow, *Technical Change and the Aggregate Production Function*, 39 *Rev. Econ. & Stat.* 312 (1957). The role of patents in this activity is of increasing scholarly interest. *E.g.*, David Silverstein, *Patents, Science and Innovation: Historical Linkages and Implications for Global Technological Competitiveness*, 17 *Rutgers Computer & Tech. L.J.* 261 (1991); Zvi Griliches, *Patents: Recent Trends and Puzzles*, in *Brookings Papers on Economic Activity: Microeconomics* 291 (Martin N. Baily & Clifford Win-

¹ I use the term "innovation" in Schumpeter's meaning of the combination of invention and investment. Joseph A. Schumpeter, *Capitalism, Socialism, and Democracy* (3d ed. 1950). Schumpeter was one of the first economists formally to recognize that invention of itself produces no economic effect, while patent-based innovation has a positive impact on the economic system as new industries and new goods displace the old.

ston eds., 1989). The technology-user community has always had a practical comprehension of the value of various innovation incentives in particular commercial contexts. *See Domestic Policy Review of Industrial Innovation*, Department of Commerce (1979).

The doctrine of equivalents derives from the principle that an inventor should be secure in the patent rights granted by the law, even against those who manage to avoid the letter of the invention as it was described or claimed in the patent document. Early in United States patent history Justice Story stressed the superior right of the inventor as against "mere colorable alterations:"

The first question for consideration is, whether the machines used by the defendant are substantially, in their principles and mode of operation, like the plaintiff's machines. . . . Mere colorable alterations of a machine are not sufficient to protect the defendant. . . . The material question, therefore, is not whether the same elements of motion, or the same component parts are used, but whether the given effect is produced substantially by the same mode of operation, and the same combination of powers, in both machines. Mere colorable differences, or slight improvements, cannot shake the right of the original inventor.

Odiorne v. Winkley, 18 F. Cas. 581, 582 (C.C.D. Mass. 1814) (No. 10,432) (charging the jury). As in ensuing decisions, *e.g.*, *Winans v. Denmead*, 56 U.S. (15 How.) 330, 343 (1854); *Singer Mfg. Co. v. Cramer*, 192 U.S. 265, 285-86 (1904); and *Sanitary Refrigerator Co. v. Winters*, 280 U.S. 30, 41 (1921); the trier of fact was directed to look to the substance of the invention, and ascertain whether the infringer took that substance. Although some legal theorists have argued that patent principles derived from property and contract law require greater precision than is available from equivalency, the

Court's decisions on equivalency consistently emphasize the interest of justice, in aid of the constitutional purpose of technologic progress.

Patent Claims

The juridical approach to equivalency began before patents contained "claims" in the detail in which they are now written, and did not change as claim style evolved. The Patent Act of 1836 required all patentees to state what was "claimed," a practice that was already the custom. See U.S. Patent Office, *Information to Persons Having Business to Transact at the Patent Office* (1836), reproduced in Karl Lutz, *Evolution of the Claims of U.S. Patents*, 20 J. Pat. Off. Soc'y 457, 464 (1938). The development of claim style² was guided by growing cadres of professional patent examiners and registered patent attorneys, along with the growth of prior art and competing

² The evolution from so-called "central" to "peripheral" claiming was gradual, and apparently unrelated to the difference between the wording of the 1836 phrase "particularly specify and point out the part . . . which he claims," Patent Act of 1836, ch. 357, § 6, 5 Stat. 117, 119, and the 1870 phrase "particularly point out and distinctly claim the part . . . which he claims," Patent Act of 1870, ch. 230, § 26, 16 Stat. 198, 201. The history of H.R. No. 1714 (the Patent Act of 1870) suggests that the change in the words of Section 26 was not deemed significant, for this change is not mentioned in the records of the enactment. See Cong. Globe, 41st Cong., 2d Sess. 2681-83 (1870). The Commissioner of Patents wrote that "[i]n 1870 the patent law was revised, but the revision was in the nature of a consolidation of the statutes then in force." Charles Eliot Mitchell, Commissioner of Patents, *An Address Delivered at the Proceedings of the Congress on the "Birth and Growth of the American Patent System"* (1890), reprinted in *Patent Centennial Celebration Proceedings and Addresses*, 43-55, at 52 (1891). Commissioner Mitchell stated that the 1836 Act "created an epoch," *id.* at 50, defining one of the important changes brought about by the 1836 Act to be "the distinction drawn between the description of the invention and the claim." *id.* at 51, the significance of the claim being that it "set definite walls and fences about the rights of the patentee," *id.*

technologies. Indeed, the increasing specificity in claim style probably made it easier for the "unscrupulous copyist," the words of *Graver Tank*, to appropriate the substance of the invention while evading the letter of the claims.

The public notice aspect of what the patentee "claims," upon interaction with the patent examiner and on consideration of the prior art, is a powerful argument for strict literal reading of claims, even if the result is injustice in particular cases. However, the patent system is of ever-increasing importance, due to the dependence of industry on technology, the reduced opportunity to rely on trade secrecy because of today's enlarged analytical capability, the ease and speed of imitation and modification once the innovator has shown the way, the harshness of modern competition, and the ever-present need for industrial incentives. These factors weigh on the side of the innovator, and thus favor a rule that tempers the rigor of literalness. See *Patlex Corp. v. Mossinghoff*, 758 F.2d 594, 599, 225 USPQ 243, 247 (Fed. Cir.) ("encouragement of investment-based risk is the fundamental purpose of the patent grant"), modified, 771 F.2d 480, 226 USPQ 985 (Fed. Cir. 1985).

The principle of equivalency thus serves a commercial purpose, as it adjusts the relationship between the originator and the second-comer who bore neither the burden of creation nor the risk of failure. However, there is also the major consideration of the progress of technology. How does the existence of a "doctrine" that transcends the statutory purpose of legal notice of the patent's scope affect that progress? Does the doctrine of equivalents affect the research, development, investment, and commercialization decisions of today's technologic industry, in a way that concerns the national interest?

And if not, what's all the fuss about?

Innovation and Equivalency

Despite our national dependence on technologic advance, there is a sparseness of practical study of whether and how the doctrine of equivalents affects modern industrial progress and the public welfare. However, a helpful debate is developing among scholars, centered upon the optimum scope of patent claims. For example, Robert P. Merges and Richard R. Nelson, *On the Complex Economics of Claim Scope*, 90 Colum. L. Rev. 839 (1990), suggest that the optimum claim scope is that which will promote "competition in research"; while Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & Econ. 265, 275-80 (1977), suggests that since competition in research is inefficient, broad claims to the originator would provide optimum incentives and serve the larger social welfare. These analyses have drawn thoughtful commentary and further development. For example, touching on the complexity of the issue of equivalency in *Patent Law and Rent Dissipation*, 78 Va. L. Rev. 305, 348 (1992), Mark F. Grady and Jay I. Alexander write that the "doctrine of equivalents is really the method through which the extent of an invention's technological signal is established." These and other controversial theories aid our understanding, although practical implementation seems to be quite elusive, for determination of the national interest is as complex as the many forms of technology and the varied research and industrial strategies of their development.

I need not belabor that the economic risk in developing new technology is high, that the potential return must warrant the risk, and that the return must pay for the failures as well as the successes. See Paul A. Samuelson & William D. Nordhaus, *Economics* 658 (12th ed. 1985) (in general, a higher return is required for higher risk than for lower risk investment). The goal on which we must concentrate is the public welfare, as summarized in *Mazer v. Stein*, 347 U.S. 201, 219, 100 USPQ 325, 333 (1954):

The economic philosophy behind the clause empowering Congress to grant patents and copyrights is the conviction that encouragement of individual effort by personal gain is the best way to advance public welfare through the talents of authors and inventors in "Science and useful Art."

The principle is today of international force, as the United States seeks to enhance its national strength and international trade with the aid of intellectual property. Indeed, recent economic history illustrates the stagnation of the economy coinciding with periods of diminished industrial investment in technologic advance. Professor Griliches, *supra*, at 291, wrote "Among the many explanations for the worldwide productivity slowdown in the 1970s, the exhaustion of inventive and technological opportunities remains a major suspect."

The analytic complexity with respect to the doctrine of equivalents arises because technologic growth benefits not only from the activities of the originators, but also from those who improve, enlarge, and challenge. The larger public interest requires setting the optimum balance between the purpose of supporting the innovator, in the national interest, and the purpose of supporting improvement and competition, also in the national interest. The question that I have sought to explore is how the policy and law of the doctrine of equivalents affects this balance.

Improvements and Equivalency

Persons who appropriate the patentee's concept may add technologic value in a variety of ways: perhaps by developing a different path to the new markets opened by the patentee, perhaps by adapting later-developed technology to enhance that of the patentee, perhaps by perceiving alternatives and opportunities from a different perspective than that of the patentee. All of these activities would bear lower risk to the appropriator if the patentee's claims were strictly limited to their literal scope, for the

patentee's access to the remedy of equivalency imposes upon the appropriator the risk of litigation, damages, and injunction.

Most (but perhaps not all) students of technologic innovation today accept the proposition that there is a larger welfare benefit when the inventor is protected against appropriability by a competitor who did not bear the commercial risk. The cost of substantially imitating an established product, with or without improvements, is usually lower, and always less risky, than the originator's cost of creating, developing, and marketing the new product. Such a competitor can act in a shorter time than was needed by the patentee, and undercut the return to the patentee. See Edwin Mansfield, Mark Schwartz & Samuel Wagner, *Imitation Costs and Patents: An Empirical Study*, 91 Econ. J. 907 (1981). Because of the diminished risk-weighted incentive to the originator, it has generally been concluded that "total welfare, but not the welfare of consumers, would be increased by making it more difficult to produce close substitutes for existing products." Stanley M. Besen & Leo J. Raskind, *An Introduction to the Law and Economics of Intellectual Property*, 5 J. Econ. Persp. 3, 5 n.2 (1991).

These and other economic studies support the role of the doctrine of equivalents as a mechanism that makes it more difficult to produce close substitutes, whether by imitation or improvement. There are additional policy refinements, however, for improvements occur on a continuum between minor and major. Not all improvements are equal, and neither are their implications for technologic growth. Much of the current writing on the economic and developmental implications of the scope of patent rights is directed to technologies that are rapidly evolving, primarily in the fields of biotechnology and electronics. There is a growing body of interesting thinking about how to adapt the traditional modes of patenting to the scientific and commercial needs of these technolo-

gies. See, e.g., Pamela Samuelson, Randall Davis, Mitchell D. Kapor & J.H. Reichman, *A Manifesto Concerning the Legal Protection of Computer Programs*, 94 Colum. L. Rev. 2308 (1994) (proposing a "hybrid" protection for computer software beyond that available from existing legal regimes); Dan L. Burk, *Biotechnology and Patent Law: Fitting Innovation to the Procrustean Bed*, 17 Rutgers Computer & Tech. L.J. 1 (1991). Indeed, some of the analyses relating equivalency and scientific/technologic advance, in the context of modern innovation practices, suggest the thought that the doctrine of equivalents today serves the unexpected purpose of being the only readily available tool for application of the law to new technologies. See, e.g., Yusing Ko, *An Economic Analysis of Biotechnology Patent Protection*, 102 Yale L.J. 777 (1992) (analyzing decisions that applied the doctrine of equivalents).

If minor improvements are likely to be captured by the doctrine of equivalents, this might cause the would-be competitor to move to diverging areas instead of simply tagging along at the periphery of the patentee's claims. On this theory the doctrine of equivalents, like the grant of broad claims, could encourage "leapfrogging" advances instead of minor improvements and substantial imitation. This would enhance the growth of technology overall, and thus serve the public welfare. The patentee too may be encouraged by the broader commercial protection of the doctrine of equivalents, particularly if the optimum commercial form turns out to be at the edge of the patent's claims. A patentee may also be encouraged to continue to study and invest in fine tuning the invention, with the added security that the investment, if the project is successful, will be protected even if the patentee's improvements are not separately patentable. See Suzanne Scotchmer, *Standing on the Shoulders of Giants: Cumulative Research and the Patent Law*, 5 J. Econ. Persp. 29 (1991) (discussing whether patent protection provides incentives for cumulative research). Conversely, it is of

course possible that the originator will allow the technology to stagnate, or that would-be competitors would simply be diverted from the field; these possibilities, however, appear to depend less on the patent system than on many other factors. Each industry has its particular motivations, resources, and competitive situations. They have been well studied for fields that have high research costs, for these fields tend to be more dependent on the patent system as an innovation incentive. See, e.g., Henry G. Grabowski, *The Determinants of Industrial Research and Development: A Study of the Chemical, Drug, and Petroleum Industries*, 76 J. Pol. Econ. 292 (1968). Merges and Nelson, *supra*, at 871, discussing the economic models broadly applicable to various types of claim scope, suggest that there is a point at which the available claims are so narrow that the advantages to imitation (as compared to innovation) become sufficiently large that erstwhile innovators will simply wait for something to imitate. Such a scenario is not uncommon for mature technologies. No analysis is generally applicable to all fields of technology and all competitive relationships, as illustrated in the growing literature on the function of patent-type economic incentives. See generally John W. Schlicher, *Patent Law: Legal and Economic Principles* (1992).

Competition and Equivalency

In thinking about the effect of the doctrine of equivalents on both innovators and competitors, one must consider how technology, the patent system, and competition interact. The question of equivalency is presented to judges after the competitive situation has crystallized, and thus we tend to focus on the technologic issues as they reach us in a lawsuit, and not on how the technology got to that stage. However, technologic advance, like scientific advance, usually proceeds in small, incremental steps, building on what has gone before, building on one's own work and the work of others. The steps, accumulating, may eventually produce the next generation of technologic

progress. Yet each step, viewed alone, may be an insubstantial change. Even minor improvements can displace the originator while adding little to advancing the field. See Besen & Raskind, *supra*, at 5 & n.2. It is the insubstantial change that is caught by the law of equivalency.

Competition in research and development is important to the nation. There are important distinctions between competition in the research (inventing) stage and in commercial activity. Competition in research, however inefficient its economics, serves the advancement of knowledge in myriad ways. It is often observed that investment in commercialization tends to be more risk-sensitive than investment in research, apparently since the costs of product development and capital plant often dwarf the cost of making the invention. Yet industrial innovation is served by the patent system when the commercial investment is made. To the extent that the doctrine of equivalents enlarges the value of the patent to the innovator it also increases the net social value, as well as serving as a risk-reducing factor in commercial investment. The relevant economic theories on these points are varied, and the analyses are interesting. See, e.g., Janusz A. Ordover, *Economic Foundations and Considerations in Protecting Industrial and Intellectual Property*, 53 Antitrust L.J. 503, 506-07 (1985) (discussing the effects on innovative efforts of competition in research and development).

The complexities of these relationships far exceed the highlights I have touched. On the present state of the law I have concluded that the doctrine of equivalents, on balance, serves the interest of justice and the public interest in the advancement of technology, by supporting the creativity of originators while requiring appropriators to adopt more than insubstantial technologic change.

Equivalency and Risk

Patent law provides rules of exclusion, priority, and competition that are understood by today's industrial enterprises. Whether from the viewpoint of the originator of technology or the appropriator, the impact of the doctrine of equivalents is as only one of many commercial uncertainties and possibilities. I doubt if much, or any, reliance is placed by originators on the doctrine of equivalents when specific investment decisions are made; at least not by those who have studied precedent. The effect of the doctrine of equivalents as an innovation incentive is more generalized, more subtle.

I believe that the major contribution of the doctrine of equivalents is now, and always has been, to the idea of a fairer, less technocratic, more practical patent system; one that is oriented toward encouraging technologic innovation and discouraging free riding; one that is not at the "mercy of verbalism," in the words of *Graver Tank*. In this way the doctrine of equivalents can contribute a degree of added investment confidence to the inherently risky environment of new technology. However, it will not serve that function if its application is so unpredictable that it can not be relied upon. Indeed, the determination of technologic equivalency should be reasonably predictable by not only the innovator but also the competitor. When applied to a particular patented invention, it should be reasonably predictable whether a specific device will be found "equivalent."

The possibility of infringement litigation is a risk factor for both the patentee and the appropriator. The patentee will have weighed the strength, breadth, and enforceability of the patent, along with other market benefits and risks, before making a major investment in commercialization. In contrast, for the second-comer these risks are evaluated only after the patentee's product has been

proved successful in the marketplace. A competitor who operates within the "penumbra" of the claims, appropriating the inventor's contribution while skirting the claims, may be deemed to have taken a calculated commercial risk that includes possible litigation. The degree of uncertainty of the outcome necessarily affects the commercial risk; the very existence of a "doctrine" that is applied variably by judges, and at great expense to the parties, has an effect on business decisions.

Some *amici curiae* complained that as lawyers they can not advise clients with confidence about how close they can come to a patentee's invention, because of the doctrine of equivalents. However, no *amicus* guided us to resolution of the interests and rights of clients on both sides of the issue, or the national interest. Industry has been silent, except of course for Hilton Davis and Warner-Jenkinson, who have competently argued their positions, each finding sound support in this court's precedent. Uncertainty at the margins of competing policies is not unique to patent law, and is probably no more prevalent than in other commercial causes of action. However, the court's decision today provides no more certainty than did the 1950 decision in *Graver Tank*, leaving in place the problems of application of the doctrine that have concerned this court.

Uncertainty in the law always disserves the larger public interest, although usually one side or the other is served by it. The uncertainty in judicial application of the doctrine of equivalents surely serves the patentee, perhaps disproportionately. See Louis Kaplow, *Rules versus Standards: An Economic Analysis*, 42 Duke L.J. 557, 568-77 (1992) (discussing how the cost of compliance with law increases with imprecision of the law). A few authors have offered interesting suggestions for reducing the uncertainty while retaining the just purposes of the doctrine of equivalents, although most authors simply criticize the past without helpful suggestions for the future.

Economic analysis is reasonably consistent in its conclusion that technologic, commercial, and public interests coincide to favor law that favors the innovator as against the second-comer. However, the application of this analysis to the complexities of patent-dependent innovation is not fully understood. And the cases that reach us rarely present a simple choice, even when the "doctrine" is viewed solely as an instrument of justice between specific parties. *Graver Tank* was an easy decision on its facts. *Hilton Davis v. Warner-Jenkinson* is not, in my view, an easy decision on its facts.

Rethinking the Doctrine

Reviewing past decisions that turned on equivalency, one perceives a few dominant scenarios. Usually the accused infringer was already in the commercial field of the invention, and the patented invention was making inroads into its business, providing competitive pressure for technologic response. Occasionally, although rarely, the second-comer made the invention independently.³ I have made a rough classification of four of the principal circumstances in which the doctrine of equivalents has appeared in litigation.

1. The patent actually claimed the aspect that is sought to be reached under the doctrine of equivalents, but:

³ The patent statute permits an independent inventor to establish its prior right through an "interference" proceeding. Although *Warner-Jenkinson* states that it had the idea first and independently, it apparently did not attempt to provoke a patent interference with *Hilton Davis*. Part of the policy justification of the doctrine of equivalents is that if a person who is practicing substantially the same invention can not obtain priority as of right, through the statutory interference process, that person has no right to operate at the fringes of the prior invention. That is, the doctrine of equivalents assures no greater right to one who does not contest priority, than to one who loses a priority contest.

(a) the broad claim that would have been literally infringed was held invalid, and the patentee seeks to recover part of that broader scope under the doctrine of equivalents; and example is *Graver Tank*;

(b) the broad claim that included literally the element for which equivalency is at issue is not infringed because of other limitations, and the patentee seeks to recover that broader scope through the doctrine of equivalents; an example is *Malta v. Schulmerich Carillons Inc.*, 952 F.2d 1320, 21 USPQ2d 1161 (Fed. Cir. 1991).

2. The patent claims did not include a known substitute for a component of the claimed combination:

(a) in *Rite-Hite Corp. v. Kelley Co.*, 819 F.2d 1120, 2 USPQ2d 1915 (Fed. Cir. 1987), a known ratchet and pawl mechanism in the claim was replaced with a known rack and pinion mechanism in the accused device;

(b) in *Perkin-Elmer Corp. v. Westinghouse Electric Corp.*, 822 F.2d 1528, 3 USPQ2d 1321 (Fed. Cir. 1987), a known tap transformer in the claim was replaced with a known loop transformer in the accused device.

3. "Obvious" changes are made in the patentee's device, avoiding the literal scope of the claims:

(a) the accused device is in the space between the patent's granted claim and the originally filed claim, which the examiner deemed overly broad and required to be narrowed; as in *Laitram Corp. v. Cambridge Wire Cloth Co.*, 863 F.2d 855, 9 USPQ2d 1289 (Fed. Cir. 1988);

(b) the accused device is in the space between the patent's claim and the prior art; as in *Wilson Sport-*

ing Goods Co. v. David Geoffrey & Assoc., 904 F.2d 677, 14 USPQ2d 1942 (Fed. Cir. 1990).

4. Usually because of developments in technology, a part of the claimed combination is modified or becomes unnecessary:

(a) a step in a multistep process is combined with another step, as in *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 9 USPQ2d 1962 (Fed. Cir. 1989);

(b) a step in a multistep process is omitted, as in *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931, 4 USPQ2d 1737 (Fed. Cir. 1987) (*en banc*).

In each of these four examples, infringement by equivalency was found in (a) but not in (b). It is not the doctrine of equivalents, but the uncertainty of its application that causes the uncertainty in commercial relationships. Our decision today, while rejecting the proposed equitable considerations that would have added further uncertainty, does not answer the difficult question of improving the predicatability and reducing the uncertainty of technologic decisionmaking. For this reason, I have wondered whether it may be possible to devise a better way to meet the needs now served by the doctrine of equivalents.

For example, the patent law places strong pressure on filing the patent application early in the development of the technology, often before the commercial embodiment is developed or all of the boundaries fully explored. Since the patentee is barred from enlarging the claims after two years from the date of issuance, later developments are excluded from the patent system unless they independently meet the criteria of patentability. From the originator's viewpoint, the inability to protect such developments may be a factor in recourse to the doctrine of equivalents. And

from the viewpoint of the potential competitor, there is no opportunity to test possible encumbrances on later developments.

Most legal documents can be reformed, or amended, or supplemented. However, the available mechanisms for patent documents are extremely limited, for neither the reissue nor reexamination procedure permits adding to the disclosure. Thus some technologic variants can be reached only through litigation invoking the doctrine of equivalents. I invite creative thinking by the bar and technology communities, for if there were statutory procedures whereby patentees could protect their continuing work, there might be justification for limiting infringement to the literal scope of claims thus obtained.⁴ A statutory system that could accommodate the major factual scenarios of technologic equivalency could provide added certainty both to patentees and to those seeking to build on the subject matter of the patent. I commend the various suggestions already made in recent literature, for they start us on the path to a more useful mechanism for resolution of the question of technologic equivalency.

Summary

The patent law is directed to the public purposes of fostering technological progress, investment in research and development, capital formation, entrepreneurship, innovation, national strength, and international competitiveness. Our review of the doctrine of equivalents takes place in this context, not as an abstraction insulated from commercial reality. The questions before us are not simple. However, until the technology community provides a better answer, I know of no improvement upon the Court's

⁴ For example, some countries have handled the issue of continuing developments through a statutory form called a "patent of addition", a mechanism whereby a patentee can add additional disclosure and claim to a patent after it has issued.

holding that the doctrine of equivalents may be invoked when needed to "temper unsparing logic and prevent an infringer from stealing the benefit of an invention." *Graver Tank*, 339 U.S. at 608, 85 USPQ at 330 (quoting *Royal Typewriter Co. v. Remington Rand*, 169 F.2d 691, 692, 77 USPQ 517, 518 (1948)).

PLAGER, *Circuit Judge*, with whom *Chief Judge ARCHER* and *Circuit Judges RICH* and *LOURIE* join, dissenting.

1.

The court today tells us some important things about the doctrine of equivalents. We are told that application of the doctrine turns on one primary test: the substantiality of the differences between the claimed and accused products.¹ The function-way-result test, so often recited since *Graver Tank* as the controlling test, is not "the" test. Rather, in assessing substantiality, other objective indicia may be considered, such as the known interchangeability of the accused and claimed elements by persons reasonably skilled in the art; whether there is evidence of intentional copying; and whether there is evidence of an attempt to design around the patented matter.

Function-way-result still plays a part, although exactly what that part is may seem obscure to some. That test, it is explained, arose in days of relatively simple mechanical technology. More sophisticated and innovative products may require more sophisticated analysis and thus different evidence, although it would appear that this depends as much on the lawyer and the judge as on the product: the trial judge will decide whether the additional evidence, if any, offered by the patentee is 'relevant' to the case. Straight function-way-result turned out to be sufficient for the ultrafiltration through osmosis technology involved in this case.

The court also tells us that the burden is on the patentee to produce the necessary evidence of insubstantiality, and that these evidentiary questions are questions of fact.

Taken singly, most of these propositions are familiar. Packaged as they are, they may come as a revelation to

¹ The term "product" is used here to refer to any category of patentable subject matter. See 35 U.S.C. § 101 (1988).

many in the bar, as they no doubt do to the parties in this case. The court's statement that "[t]his case presents an opportunity to restate—not to revise—the test for infringement under the doctrine of equivalents" is difficult to take literally. What the court has given us is a recipe in which familiar ingredients are to be mixed in a different way, to produce what must be presumed to be a better product. But there is no reason to suppose that the new product will in fact be better. The mixing is still to be done in the dark, by the multiple hands of a jury under minimal instruction. When that product, an announced "yes, it infringes" or "no, it does not" arrives at this court, we will remain as blinded as we are now in our ability to pierce the doctrinal veil. If we are to know where we are going with the doctrine of equivalents, we must know whence it came. The court denies that the doctrine has its roots in a court's traditional equity powers, but provides no substitute explanation for its origin. As a result, we are left with two major problems that are not satisfactorily resolved: what are the controlling bounds of the doctrine, and what are the proper respective roles of judge and jury.

2.

As a preliminary matter, it may be asked why the court needs to undertake this inquiry into the doctrine of equivalents at all. Is something broke that needs fixing? The short answer is yes.² One problem is that, whatever role the doctrine of equivalents may have played in earlier

² For commentary on the doctrine, and specific criticisms, see, e.g., Peter Blackman, *Doctrine of Equivalents: Ruling Unlikely to Resolve Tension in Patent Law*, N.Y.L.J., July 21, 1994, Corporate Update, at 5; Rudolph P. Hofmann, Jr., *The Doctrine of Equivalents: Twelve Years of Federal Circuit Precedent Still Leaves Practitioners Wondering*, WM. MITCHELL L. REV. 1033 (1994); Paul C. Craane, Comment, *At the Boundaries of Law and Equity: The Court of Appeals for the Federal Circuit and the Doctrine of Equivalents*, 13 N. ILL. U. L. REV. 105 (1992).

times—and while that is not immaterial it is largely irrelevant—today the doctrine is regularly used by patentees to seek greater coverage for their patents than the patent statute grants. Their demands are presented to a jury which is told to decide the issue based on a formulaic chant—function, way, result—which, as Judge Lourie so aptly describes in his dissent, provides little in the way of guidance, and in some cases may be of no persuasive significance at all.

A related problem is that our current case law imposes no substantial constraints on the availability of the doctrine. Any patentee may invoke it as a second prong to an infringement suit, in addition to the statutory cause of literal infringement. Prior to 1870, the date when inventors were first statutorily required to particularly and distinctly claim their invention, see Act of July 7, 1870, § 26, 16 Stat. 201, the scope of protection turned on the embodiments disclosed in the specification. Courts read these specifications broadly, to include equivalents, in order to give the patentee the full scope of the invention. Over the past hundred or so years, that practice has given way to a focus on precisely what the inventor claims as the invention. The specification remains important, not as the definition of the invention, but as a description of it and as an aid in interpreting the language of the claims.

By today's opinion, the majority essentially blesses the continued unfettered use of the doctrine of equivalents, at the discretion of a jury, noting that in some cases at least the ritual chant will be quite sufficient justification for a rewriting of the claimed limitations. This ignores the fact that, after 1870, claims, not their equivalents, are the determinants of the scope of protection granted by the patent. Claiming practice today serves a purpose which the earlier practice did not, namely providing competitors with notice of the precise invention that they may not make, use, or sell.

Another problem with the doctrine is that appellate review of many of these doctrine of equivalents cases is largely *pro forma*. Federal district judges, perhaps understandably, by and large make little pretense of liking these patent infringement cases, and are quite content to give them, and all the issues in them, to juries to decide. The cases typically come to us on appeal with nothing more than a general verdict finding infringement. There is no explanation by the jury of the rationale behind their verdict, if any exists. This case is a good example.³

In our review we must assume that the jury understood the technology, understood the law of patents and the policies that underlie it, understood the function, way, and result of the matter, and arrived at a considered decision. It is enough to sustain a jury verdict of infringement by equivalents if the trial court's instructions are without prejudicial error (oftentimes this translates into the less said the better), and if there is any substantial evidence in the record which the hypothetical reasonable juror could have believed, and so believing, arrived at the verdict. A plaintiff must have a virtually impossible case, or incompetent counsel, to fail to have something in the record which can be argued is substantial enough. In short, though the opinions we write, with their routine recitations of our standard of review followed by the

³ The jury's findings on infringement consisted in its entirety of the following:

We the Jury, unanimously find that plaintiff Hilton Davis has proved by a preponderance of the legal evidence that defendant Warner-Jenkinson has infringed upon the following claims of the Hilton Davis Patent:

Claim 1	Yes (infringed) X	No (not infringed) —
Claim 2	Yes (infringed) X	No (not infringed) —
Claim 3	Yes (infringed) X	No (not infringed) —
Claim 13	Yes (infringed) X	No (not infringed) —
Claim 14	Yes (infringed) X	No (not infringed) —

inevitable citations, may tend to obscure the reality, the reality is that the doctrine of equivalents is a virtually uncontrolled and unreviewable license to juries to find infringement if they so choose. And this is done largely without regard to and independent of the express limitations of the patent claims which may have brought about their allowance by the Patent and Trademark Office (PTO) in the first place. See *Perkin-Elmer Corp. v. Westinghouse Elec. Corp.*, 822 F.2d 1528, 1532-33, 3 USPQ 2d 1321, 1324-25 (Fed. Cir. 1987) ("One must start with the claim, and, though a 'non-pioneer' invention may be entitled to some range of equivalents, a court may not, under the guise of applying the doctrine of equivalents, erase a plethora of meaningful structural and functional limitations of the claim on which the public is entitled to rely in avoiding infringement. . . . The statement should not be interpreted as sanctioning the treatment of claim limitations as insignificant or immaterial in determining infringement. 'It is . . . well settled that each element of a claim is material and essential, and that in order for a court to find infringement, the plaintiff must show the presence of every element or its substantial equivalent in the accused device.'") (quoting *Lemelson v. United States*, 752 F.2d 1538, 1551, 224 USPQ 526, 533 (Fed. Cir. 1985) (footnote omitted)). The obligation on the inventor to particularly point out and distinctly claim what the applicant regards as his invention, discussed below, the legitimate practice of competitive designing around, and the opportunities given to the public to benefit from the mandatory disclosures required of the patentee, all are thrown into disarray by this unpredictable aspect of current patent litigation.

Responsibility for these problems and for the unsatisfactory situation they create lies with the judges. It is the result of how we have interpreted Supreme Court opinions on the matter, and how, largely by default, we have permitted the practice of patent litigation to take the

shape it now is in. It is our responsibility to address the situation, and to take effective corrective action. We and the Supreme Court are the only two appellate courts with authority to do this. It is regrettable that, in today's opinion, the majority abdicates this responsibility, leaving to the Supreme Court the obligation of attending to the problem if it is to be attended to at all.

3.

Turning, then, to the question of the doctrine's roots, and thus its boundaries, our examination begins, as it must, with the statute that creates and defines the patent right, 35 U.S.C. §§ 1-376.⁴ The application for a patent must include a specification which "shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." 35 U.S.C. §§ 111, 112 ¶ 2. It is the claims that define the metes and bounds of the right to exclude others from making, using or selling the invention that is granted by the patent. *Zenith Lab., Inc. v. Bristol-Myers Squibb Co.*, 19 F.3d 1418, 1424, 30 USPQ2d 1285, 1290 (Fed. Cir.), *cert. denied*, 115 S.Ct. 500 (1994).

This has been true for a long time. In the now century-old case of *Keystone Bridge Co. v. Phoenix Iron Co.*, 95 U.S. 274, 278 (1877), the Supreme Court said:

Since the act of 1836, the patent laws require that an applicant for a patent . . . "shall particularly specify and point out the part, improvement, or combination which he claims as his own invention or discovery." This provision was inserted in the law for the purpose of relieving the courts from the duty of ascertaining the exact invention of the patentee

⁴ Unless otherwise noted, all citations to the United States Code are to the 1988 version.

by inference and conjecture, derived from a laborious examination of previous inventions, and a comparison thereof with that claimed by him. This duty is now cast upon the Patent Office. There his claim is, or is supposed to be, examined, scrutinized, limited, and made to conform to what he is entitled to. If the office refuses to allow him all that he asks, he has an appeal. But the courts have no right to enlarge a patent beyond the scope of its claim as allowed by the Patent Office. . . . When the terms of a claim in the patent are clear and distinct (as they always should be), the patentee, in a suit brought upon the patent, is bound by it. *Merrill v. Yeomans*, 94 U.S. 568. He can claim nothing beyond it.

Judge Rich, explaining current American law to European judges, described it this way:

The U.S. is strictly an examination country and the main purpose of the examination, to which every application is subjected, is to try to make sure that what each claim defines is patentable. To coin a phrase, *the name of the game is the claim*. . . . the function of claims is to enable everyone to know, without going through a lawsuit, what infringes the patent and what does not.

Giles Rich, *The Extent of the Protection and Interpretation of Claims—American Perspectives*, 21 INT'L REV. INDUS. PROP. & COPYRIGHT L. 497, 499, 501 (1990).

Nothing in the statute talks about extending the patent right to the equivalents of what is claimed, or to any other version of the invention beyond that described and claimed in the specification. "The specification shall contain a written description of the invention . . .," 35 U.S.C. § 112 ¶ 1, and the patent covers that which is "distinctly claim[ed]." 35 U.S.C. § 112 ¶ 2. If Congress wanted to provide for equivalents to what is claimed, it knew how to

do it. In a means plus function claim, for example, the structure, material, or acts that support the claim are to be construed to cover the corresponding structure, material, or acts described in the specification "and equivalents thereof." 35 U.S.C. § 112 ¶ 6. One looks in vain for similar language qualifying the claims that are at the heart of the patent right.

The doctrine of equivalents is a judge-made exception to these statutory mandates. Congress is free to make law without necessarily explaining the reasons for its rules, but that is not a power with which courts are endowed. Nor are courts empowered to rewrite legislation. They may not add new requirements to a comprehensive statutory scheme when there is an absence of even a facially-plausible provision alleged to be subject to interpretation.

Although courts are not empowered to rewrite or add to legislation, the English Chancellor took upon himself in an appropriate case, and American courts of equity have followed suit, the role of protecting legal rights, including rights created by statute, from abuse by a too-narrow application of the law causing an unjust result. *See generally* FLEMING JAMES, JR., CIVIL PROCEDURE 8-16 (1965); F.W. MAITLAND, EQUITY, 1-22 (1929). This power, however, was carefully cabined. There has to be a showing of truly special circumstances, of a situation in which a wrong would be committed by a mindless application of law. In such a situation, the court of equity does not grant new or unlimited rights to a claimant, but rather protects the claimant's established legal rights by providing a uniquely equitable remedy.

The legal rights established by a patent are defined by the claims. Competitors and other members of the public are entitled to rely on the scope of the claims set out in a patent, as the statute requires, and to design around the patentee's statutorily-protected rights. *Hoganas AB v. Dresser Indus., Inc.*, 9 F.3d 948, 951, 28 USPQ2d 1936,

1939 (Fed. Cir. 1993) ("It would not be appropriate for us now to interpret the claim differently just to cure a drafting error. . . . That would unduly interfere with the function of claims in putting competitors on notice of the scope of the claimed invention."). In the famous nose of wax analogy, the Supreme Court in *White v. Dunbar*, 119 U.S. 47, 51-52 (1886), said:

Some persons seem to suppose that a claim in a patent is like a nose of wax, which may be turned and twisted in any direction, by merely referring to the specification, so as to make it include something more than, or something different from, what its words express. . . . The claim is a statutory requirement, prescribed for the very purpose of making the patentee define precisely what his invention is; and it is unjust to the public, as well as an evasion of the law, to construe it in a manner different from the plain import of its terms. This has been so often expressed in the opinions of this court that it is unnecessary to pursue the subject further.

In most cases, if the claims do not literally apply to the allegedly infringing product, that should end the matter. But, when there is a wrong for which there is no adequate remedy at law, equity courts have traditionally gone beyond the law to impose a just and equitable result. Thus in those special cases in which the competitor's product is literally different but the difference is so insubstantial as to constitute a 'fraud on the patent,' a court in the exercise of its extraordinary equity power may extend the remedy of infringement in order to protect the rights of the patentee granted by law.

The power of courts of equity to deviate from the strict requirements of law is not without limits. Even in the interests of justice, courts of equity are not free to make unfettered and unreviewable decisions. They are as much subject to rules of law as are the law courts. Thomas Jefferson, arguing against giving federal courts

broad equitable powers, said, "Relieve the judges from the rigour of text law, and permit them, with pretorian discretion, to wander into it's equity, and the whole legal system becomes incertain." 9 PAPERS OF THOMAS JEFFERSON 71 (J. Boyd ed. 1954). The supporters of a strong federal judiciary recognized the merits of the argument. In response to such concerns, Alexander Hamilton wrote, "To avoid an arbitrary discretion in the courts, it is indispensable that they should be bound down by strict rules and precedents which serve to define and point out their duty in every particular case that comes before them." THE FEDERALIST No. 78, at 529 (J. Cooke ed. 1961). This argument echoed the long-running fight between the common law courts of England and the emerging courts of equity.⁵ Blackstone wrote in his famous commentaries on the English law: "[I]f a court of equity were still at sea, and floated upon the occasional opinion which the judge who happened to preside might entertain of conscience in every particular case, the inconvenience that would arise from this uncertainty, would be a worse evil than any hardship that could follow from rules too strict and inflexible." 3 W. BLACKSTONE, COMMENTARIES 440 (1786).

The need for clear and reviewable boundaries is as applicable to patent law as to other areas of law, lest the power inherent in the doctrine of equivalents destroy the reliance on the scope of claims to which every competitor is entitled. "The inventor must 'inform the public during the life of the patent of the limits of the monopoly asserted, so that it may be known which features may be safely used or manufactured without a license and which may not.'" *United Carbon Co. v. Binney & Smith Co.*, 317 U.S. 228, 232 (1942) (quoting *General Elec. Co. v. Wabash Corp.*, 304 U.S. 364, 369 (1938)).

⁵ See T. PLUNKNETT, A CONCISE HISTORY OF THE COMMON LAW 191-98 (5th ed. 1956).

The majority opinion correctly recognizes the notion of protecting legal rights by extending a flexible remedy when the difference between the protected rights of the patentee and the product of the infringer is insubstantial. But the majority fails to acknowledge—indeed, denies—the equitable source of that remedy. The court states that the doctrine has "no equitable or subjective component," slip op. at 17, but that confuses the jurisprudential basis of the power with the evidentiary reasons for its exercise. The court further states that the question of infringement, whether literal or by equivalents, is a question of fact, a proposition that no one challenges. But the court follows that statement with the conclusion that, since infringement by equivalents is a question of fact it must therefore be a question for a jury, as if equity courts in the course of their work never decide factual issues.

The court cites cases, such as *Coupe v. Royer*, an 1895 Supreme Court decision, arguing that it proves that "the question of infringement under the doctrine presented a question requiring trial to the jury." Slip op. at 22. In addition to being somewhat antiquarian (the complaint was brought under the old form of action called trespass on the case), the opinion makes no such holding. The issue in the case was whether the patentee's machine for treating raw hides was infringed by the defendant's machine. There is nothing to indicate that the case involved anything other than a question of literal infringement as it was understood then, and the matter was tried to a jury. The trial judge instructed the jury at some length as to the meaning of the claim language, giving the language a broad construction. The Supreme Court found the judge's construction over-broad and erroneous, stating that "such construction must be in conformity with the self-imposed limitations which are contained in the claims," and cited to *Keystone Bridge*. On the relative roles of judge and jury, the court quoted from Robinson on Patents: "Where the defense denies that the invention used by the defendant is identical with that included in

the plaintiff's patent, the court defines the patented invention as indicated by the language of the claims; the jury judges whether the invention so defined covers the art or article employed by the defendant." 155 U.S. at 579. The judgment was reversed for a new trial under proper instructions.

As *Coupe v. Royer* and the other cases of that era and since establish, the law provides the patentee with a remedy for infringement of the express terms of the patentee's claims. The patentee, subject to the approval of the Commissioner of Patents and Trademarks, writes those claims, and may claim what he invents. His failure to claim what he might, or as clearly as he might, is a drafting problem, not a judicial one. This does not make light of the difficulty inherent in claim drafting, but merely identifies where the problem and its solution lie. The solution to the problem of inadequate or incomplete claim drafting is not arbitrary after-the-fact 'interpretation' under the guise of 'equivalents,' whether by judge or jury, that goes beyond anything in the claims themselves. See *Hoganas*, 9 F.3d at 951, 28 USPQ2d at 1939.

In this case, the patentee added a claim limitation of "a pH from approximately 6.0 to 9.0" in order to distinguish the Booth patent, which disclosed an ultrafiltration process using a higher pH. Why the inventors specified a low end of 6.0 is not discussed in the patent. It appears, however, that the designated lower limit was also intentional; Dr. Cook testified at trial that though the process would work to separate the dye from the impurities at pH-values as low as 2.0, a solution with a pH below 6.0 would cause "tremendous foaming problems in the plant." Each whole number below 6.0 represents a difference of 10 times the amount (the pH scale is logarithmic). Yet, under the function-way-result test approved here, a jury might well have found that a pH of 2 or 3 was equally violative under the doctrine. Surely the boundaries of a claim cannot be left that fluid and still

have claims that perform their assigned mission. Courts, either at the trial or appellate level, must be prepared to police the application of this extraordinary power in order to protect the public's interest.

4.

The majority's failure—or refusal—to acknowledge the uniquely equitable nature of the doctrine of equivalents with its built-in constraints leads to a basic error in the opinion, and that is the failure to effectively deal with the respective roles of judge and jury. The majority simply continues the status quo, which, if the plaintiff patentee chooses and the trial judge does not disagree, allows by default both literal infringement and infringement under the doctrine of equivalents to go to the jury.* For the reasons discussed earlier, that is operationally unsatisfactory and jurisprudentially unjustified, and in our opinion clearly contrary to the public interest.

The majority offers no persuasive explanation for its position. As it must, the majority recognizes that cases from this court and the Supreme Court often speak of the equitable nature of the relief afforded by the doctrine of equivalents. Slip op. at 13, and n.2. Then by way of *ipse dixit*, the majority opines that "neither the Supreme Court nor this court has invoked equity in the technical

* In *Transmatic, Inc. v. Gulton Indus., Inc.*, 835 F. Supp. 1026 (E.D. Mich. 1993), the trial court held that plaintiff was not entitled to a jury trial on the issue of infringement under the doctrine of equivalents because, *inter alia*, infringement under the doctrine of equivalents is an action in equity to which the right to a jury does not attach. Accordingly, the trial judge, at the conclusion of the trial, rendered a ruling from the bench regarding the doctrine of equivalents, finding the claims at issue not infringed under the doctrine. *Transmatic, Inc. v. Gulton Indus., Inc.*, 849 F. Supp. 526 (E.D. Mich. 1994). On appeal, we reversed, finding the claims at issue literally infringed, and therefore did not address infringement under the doctrine of equivalents. *Transmatic, Inc. v. Gulton Indus., Inc.*, 53 F.3d 1270, 35 USPQ2d 1270 (Fed. Cir. 1995).

sense of a set of principles originating in England to compensate for the historically harsh rules of common law." Slip op. at 14. The opinion makes the rather obvious point that in *Graver Tank*, the Supreme Court did not discuss clean hands, the abuse of discretion standard of review, balancing of equities, or any of a myriad of other issues that were not before it. All of which goes to establish a point with which there is no disagreement: the issue dealt with today is one that has not been directly confronted before now, either by this court or by the Supreme Court. As Judge Lourie correctly points out in his dissent, "the [Supreme] Court has not ruled in modern times, under our current practice of relying on statutory claims, as to whether the question of the applicability of the doctrine, with all the factors it outlined, must be tried to a jury when properly requested." Slip op. at 14.

Indeed, it is easy to point to cases, old and new, in which, when a jury was impanelled, the function-way-result issue was given willy-nilly to the jury along with the issue of literal infringement. It is understandable that a trial judge, who gets one patent case every few years to try, would be comfortable doing this. The fact that defense counsel have not challenged the practice tells us little, other perhaps than that conventional thinking is easier than any other kind, or that counsel for today's patent infringer will, on the morrow, represent a patentee plaintiff, so that today's jury decision adverse to the infringer may be tomorrow's big win for patentee's counsel.

Nor does the statement by the Court in *Graver Tank*, that "[a] finding of equivalence is a determination of fact," tell us who decides that question in a jury trial. The fact-law dichotomy discussed in *Graver Tank*, a non-jury case, was related to the question of the Supreme Court's standard of review when reviewing a judgment of a trial court following a bench trial. The Court had no occasion to discuss the difference between law and equity, and the respective roles of judge and jury.

To label something a fact issue tells us little about who should decide it. In traditional equitable matters—the rights of beneficiaries under trusts, mistake and fraud in contract disputes, domestic relations, to name just a few—questions of fact are regularly decided by judges. Just as matters of 'fact' may be exclusively for the judge, and not for a jury, when the issue is claim interpretation, an issue we have only recently declared uniquely the responsibility of judges, *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 34 USPQ2d 1321 (Fed. Cir. 1995) (en banc), so too matters of 'fact' belong to the court when the court exercises its equitable powers in applying the doctrine of equivalents. Cf. *Paragon Podiatry Lab., Inc. v. KLM Labs., Inc.*, 984 F.2d 1182, 1190, 25 USPQ2d 1561, 1568 (Fed. Cir. 1993) (per curiam) ("A patentee has no right to a jury trial respecting the factual element of culpable intent as part of the defense of inequitable conduct.").

Absent some special statutory grant, juries do not exercise equitable powers. There is no issue of a right to a trial by jury under the Seventh Amendment; the court does not suggest that that is the source of the jury's role. By virtue of its unique place in our legal system, and by long-standing custom and tradition, equity powers are exercisable only by judges. The authority to exercise the unique remedy which is the doctrine of equivalents lies exclusively in courts of equity.⁷

5.

There are several ways to address the anomalous situation of having had juries involved previously in the application of the doctrine of equivalents. We might acknow-

⁷ Prior to the merger of law and equity in the federal system, district courts sat in a particular case either in law or equity, as the nature of the case required, and employed separate rules of pleading and procedure. In 1938 these two bodies of jurisprudence were 'merged' so that there was only the one civil action, and only one form of pleading. Merger of the law and equity sides of course did not do away with the historical differences in judicial power, or change the relationship of judge and jury.

ledge the existence of the past practice of giving the issue of the doctrine of equivalents to juries; declare that practice to be antithetical to the jurisprudential roots of the doctrine; and end the practice. As a follow-up, we could give useful guidance to trial judges on how to assess when a situation called for the special imposition of equity into the otherwise statutorily-defined infringement context. This guidance necessarily would emphasize the importance of keeping such matters as copying, independent discovery, and wrongful intent conceptually separate and distinct. Further experience with determining when and in what circumstances the doctrine is appropriately applied would no doubt refine and extend our understanding of these matters.

This would be a bold and clean solution to the matter. Though bold, it would not be radical, its roots being squarely in the great traditions of our courts going back centuries to the office of the King's Chancellor. It would overturn no established law, and would clarify much confusion emanating from the old cases. And it cannot be denied that it would make a major contribution to bringing rationality to this area of patent law.

A second though less bold alternative might be to share the responsibility for the doctrine between judge and jury. Trial judges would be instructed that it is their responsibility to determine when the differences between the patent claims and the allegedly infringing product are so insubstantial, and the circumstances so sufficiently special, as to warrant making the remedy afforded by the doctrine of equivalents available to a patentee. This determination would be independent of the question of whether the doctrine entitles the patentee to relief. That latter question, and the actual application of the doctrine using the function-way-result formula, would be left to the jury. Again, guidance could be given to trial judges on determining when those circumstances exist. This approach to the problem of judge and jury would have the

effect of acknowledging the equitable basis for the doctrine, while preserving the historical practice of giving the function-way-result decision to the jury.

Under this alternative, the trial judge could make the determination at the beginning of the trial process, for example in response to a motion for partial summary judgment regarding the patentee's count alleging infringement under the doctrine of equivalents. Or, in an appropriate case, the trial judge could await presentation of the evidence so as to better understand the extent of the differences between the accused product and the claims, and then rule in response to a motion for judgment on that count. In either event, this court could require that on appeal there would be detailed findings of fact and conclusions of law to review, regardless of what the jury did under the function-way-result test.

This second alternative, an amalgam of two quite diverse approaches to the issue, is not without its problems. In particular, the insubstantiality assessment made by the judge overlaps in considerable degree with the function-way-result analysis to be applied by the jury. Nevertheless, this alternative, though not as bold and not as clean as the first, still would have advanced the matter, and placed in the trial courts, and in this court on review, proper responsibility to police the availability of the extraordinary equitable relief granted under the doctrine, while preserving the role that has been accorded to the jury.

Regrettably, the court today neither cabins the availability of the doctrine, nor places responsibility for determining that availability where it belongs, in the judges who created the doctrine. The court's opinion makes at most a marginal contribution to our understanding of the notion of insubstantiality as an element in analysis. It leaves unchanged the present unsatisfactory decision process, and makes little effort to effectively incorporate its newly-articulated standard into the fabric of the law. At a mini-

mum, it might have been expected that the court would express its disapproval of general jury verdicts of infringement under the doctrine, and insist that juries at least be required to articulate, through special interrogatories, the facts and conclusions that support these verdicts.⁸

The importance of recognizing the equitable basis of the doctrine is not simply that of historical accuracy. The public interest is at issue. When the question is enforcing rights that are specifically defined by statute, it can be assumed that the legislative enactment incorporates the proper balance between private and public, and enforcement of the declared private right is in the public interest. When the question is one of equitable relief, the public interest is a factor that must be weighed in the balance in each case. "As always when federal courts contemplate equitable relief, our holding must also take account of the public interest." *U.S. Bancorp Mortgage Co. v. Bonner Mall Partnership*, 115 S.Ct. 386, 392 (1994).

The matter before the court in these equivalents cases is not only the claims of the parties against each other, but the interest of the public in protecting reliance by competitors on the public record, and in ensuring that patent rights are given their due and no more. Juries may serve to resolve rights conflicts between private liti-

⁸ This court has on several occasions signalled the need for a more disciplined analysis in these cases. See, e.g., *Lear Siegler, Inc. v. Sealy Mattress Co. of Mich., Inc.*, 873 F.2d 1422, 1426, 10 USPQ2d 1767, 1770 (Fed. Cir. 1989) (holding that the three *Graver Tank* factors must be presented in the form of "particularized testimony and linking argument" or the jury is "more or less put to sea without guiding charts when called upon to determine infringement under the doctrine."); *Malta v. Schulmerich Carillons, Inc.*, 952 F.2d 1320, 1330, 21 USPQ2d 1161, (Fed. Cir. 1991) (Michel, J., concurring) ("[T]he danger that *Lear Siegler*, building directly on *Nestier Corp.*, is designed to prevent is that of the doctrine of equivalents becoming 'a result oriented catch-all.'"), *reh'g denied*, 959 F.2d 923 (Fed. Cir.), *cert. denied*, 112 S.Ct. 2942 (1992).

gants; judges bear the responsibility of ensuring that, when the claims being urged are not based on clearly defined rights, the balance that is struck is struck in the public interest.

This court should accept the duty imposed on us by Congress, as the exclusive appellate forum short of the Supreme Court, to bring a consistent and rationalized practice to the doctrine of equivalents. If we had done that, we would probably have found it appropriate to vacate the decision before us and remand the case to the trial court for further proceedings consistent with that opinion. If we somehow go wrong in the details of how we structure this judicial exercise of equitable power, the Supreme Court, sooner or later, will correct us. It is better that the Supreme Court tell us that we did our duty incorrectly than that we failed to do it at all.

LOURIE, *Circuit Judge*, with whom *Circuit Judges RICH and PLAGER* join, dissenting.

I respectfully *dissent* from the majority's disposition of this case. I do so because the trial judge did not instruct the jury concerning the doctrine of equivalents ("DOE") in accordance with our opinion today.¹ The trial judge did not tell the jury that the principal issue in evaluating infringement under the DOE is the substantiality of the difference(s) between the accused subject matter and that which is claimed. He emphasized the primacy of the function, way, and result ("FWR") test. We have today held that this is incorrect. In view of these omissions, I believe we must vacate the decision on the basis of plain error in the jury instructions and remand for retrial on

¹ The judge instructed the jury concerning the doctrine of equivalents as follows:

Hilton Davis asserts that the Warner-Jenkinson process for making food dyes infringes the Hilton Davis patent under the doctrine of equivalents. The doctrine of equivalents exists to prevent fraud on the patent.

The concept of the doctrine of equivalents is designed to protect the patent holder from the unscrupulous infringer who appropriates the invention but avoids the literal language of the claims. In this regard, consideration must be given for the purpose for which a step is used in the claims of the patent and in defendant's processes and the functions which they perform.

You may find infringement under the doctrine of equivalents when the accused process and the claimed invention perform substantially the same function in substantially the same way to yield substantially the same result even though the processes differ in name, form or shape.

Hilton Davis must prove infringement under the doctrine of equivalents by a preponderance of the legal evidence.

Though application of the doctrine of equivalents extends the protection of the patent beyond the literal words contained in the claims, it is not proper to erase the meaningful limitations of the claims on which the public is entitled to rely in avoiding infringement, and you must look to the claims section of the patent to determine the coverage and limitations of the patent.

the DOE on the basis of instructions consistent with the court's opinion. See 5A JAMES W. MOORE, *MOORE'S FEDERAL PRACTICE* ¶ 51.04 (2d ed. 1995).

I agree with the majority's conclusion that more is required for application of the DOE than meeting the FWR tests. For many years the courts have been focusing on FWR as the hallmark of a DOE analysis, citing *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 85 USPQ 328 (1950). For reasons I will elaborate on below, such a test has been inadequate, leading to confusion. Moreover, *Graver* did not prescribe this as *the* test for the DOE. The Supreme Court in *Graver* noted that equivalence is not a "prisoner of a formula," *id.* at 609, and that other factors are involved, including whether the invention was a pioneering one, whether the defendant had engaged in independent research or was an imitator, whether those skilled in the art would have known of the interchangeability of the substituted ingredients, and the substantiality of the difference(s) between the accused and patented materials.

I.

In view of the majority's determination that something more than FWR is required for application of the DOE, with which I heartily concur, I wish to explain further why I believe FWR is inadequate as the sole set of criteria for evaluation of infringement under the DOE. Patentable inventions comprise "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof" 35 U.S.C. § 101 (1988). Except for process inventions, which perforce must be defined by their component procedural steps, inventions are generally defined by structure, *i.e.*, by what they are, rather than by what they do. FWR is most useful in defining what an invention does, but it does not always tell what an invention is. See *International Visual Corp. v. Crown Metal Mfg. Co.*, 991 F.2d

768, 775, 26 USPQ2d 1588, 1593 (Fed. Cir. 1993) (Lourie, J., concurring). A statement of the "function" of a composition of matter, a manufacture, or a machine is not a definition of such an invention. The recitation of the "result" of an invention's operation surely may not be an adequate definition of what the invention is. The "way" the invention achieves its result usually describes the means or mechanism by which it operates, but it does not reliably tell what the invention is. That is what structural terms in claims are for. The dictionary defines "way" as, *inter alia*, "the mode in which something is done or happens." WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY 2587 (3d ed. 1986). That is not a definition of an invention.

One of the reasons why the courts have exhibited so much confusion over the DOE is the near exclusive focus on FWR, and the fact that the meaning of the word "way" is so obscure. The substantiality of the differences between a patented and an accused device has often been ignored or subsumed under the "way" component. Unfortunately, however, the "way" component is often satisfied when the substantiality criterion is not. Devices that perform the same function to achieve the same result in the same way may be very different. The result is that devices which should not be accorded the benefit of the DOE because of the substantiality of their differences from what is claimed can be improperly considered to be equivalent if only FWR are considered.

The field of chemistry is one in which this problem may often arise. Ironically, *Graver Tank*, the case that is our template, is a chemical case. Manganese silicate, the material substituted for magnesium silicate, is obviously a chemical, and the relationship between manganese and magnesium does raise questions of chemistry. However, the claims in that case are to a composition, more like those for a mechanical invention, in which one com-

ponent is substituted for another. Thus, the function and result of that substitution, and even the way in which the questioned component operates, were able to be readily evaluated.

However, much of today's chemical research, and hence invention, consists of new chemical compounds defined by structure, and having a variety of chemical substituents, or structural pieces. New chemical compounds differ structurally from old compounds (that is what makes them new) and yet they may perform the same function (have the same use), provide the same result, and do so in the same way. The fact that they do so in the same way does not make them substantially the same in the way they are defined, *i.e.*, by structure. I emphasized this point in my concurring opinion in *Genentech, Inc. v. Wellcome Foundation*, 29 F.3d 1555, 31 USPQ2d 1161 (Fed. Cir. 1994), in which I pointed out that a protein containing 446 amino acids could not reasonably be held to infringe a claim to a material with 527 amino acids. The difference between the materials is enormous, irrespective of FWR. One can also consider the example of the well-known analgesics aspirin and ibuprofen. These compounds have the same function (to provide analgesia, antiinflammatory activity, and lower temperature), do so in the same way (by inhibiting prostaglandin synthesis), and give the same results (kill pain, relieve inflammation, and lower fever). Yet, they have different structures, which makes them different compounds, and no knowledgeable person would consider that a claim to aspirin would be infringed by the sale of ibuprofen.

Moreover, if, following our guidance in *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931, 4 USPQ2d 1737 (Fed. Cir. 1987) (in banc), *cert. denied*, 485 U.S. 961 (1988), one tries to evaluate infringement applying only FWR according to the "all elements" rule, one encounters a practical difficulty because one generally does not know the "way" a particular substituent operates. One only

knows the function, way, and result achieved with the total compound. This is different from electronic and mechanical elements because one normally knows why each electronic or mechanical element is present in a product and what it does. Thus, it is essential that a DOE analysis focus on more than an FWR evaluation. Failure to do so can lead to the wrong result.

II.

However, I *disagree* with the majority's characterization of the "substantiality" issue. The majority emphasizes that it is *the* added factor prescribed by the Supreme Court in *Graver Tank*, the others being subsumed within it, rather than being only one of the added factors. The opinion states that the substantiality of the differences factor encompasses all the others, including the FWR test, and that the fact-finder must make a determination on this issue. I agree that substantiality is paramount. I also agree with the majority that the FWR test, along with the extent and number of differences, is an element in determining the substantiality of the differences between the invention and the accused product. Clearly, if the accused and claimed inventions are very different, there can be no infringement. However, the substantiality of the differences is still only one of the factors according to *Graver*, arguably the most important factor, which a court should consider in deciding whether to apply the DOE.

Graver Tank indicates that these other factors include whether independent development or copying has occurred, the knowledge or lack of knowledge of those skilled in the art of the interchangeability of contested elements, and the pioneer status of the claimed invention. Given the importance of claims in informing the public of what is patented, I would also include as added factors any behavior of the patentee that impairs the ability of the public to reasonably understand from the claims what

is patented. Among these could be disclosure of an unclaimed embodiment in the patent specification, thereby leading the public to believe that what is unclaimed is disclaimed, when it is that unclaimed embodiment that the patentee later seeks to hold as an infringement under the DOE. See *Unique Concepts, Inc. v. Brown*, 939 F.2d 1558, 1562-63, 19 USPQ2d 1500, 1504 (Fed. Cir. 1991). I would also consider as a factor the failure of the patentee to seek reissue of the patent to cover such embodiment if it knew of the potential infringement during the permissible statutory time period, see 35 U.S.C. § 251.³

I also believe that the majority misconstrues the meaning of the factors other than the substantiality of the differences. The majority limits the significance of copying to being part of the evaluation of substantiality. It denies that intent is meaningful and states that lack of independent development is not part of the equivalence evaluation. I believe this is incorrect. The substantiality evaluation, as noted, relates only to the difference(s) between the claimed and accused items, *viz.*, how many differences there are and how substantial they are. Whether an accused infringer has copied or has independently developed its product is a separate matter relating to what the accused did and why, rather than how close its product is to the claimed invention.

One may readily envision a spectrum consisting of copying on one extreme, independent development on the other, and designing around somewhere in between. The latter two activities are clearly praiseworthy, being consistent with the goals of the patent law. Independent development involves doing one's own work, designing one's own product rather than attempting to copy and

³ I do not intend this list to be an exhaustive list of factors that the court should analyze in evaluating infringement under the DOE. Other factors can be recognized and considered when relevant.

make minor changes in a patented product. It requires significant effort, which is readily provable. Copying and designing around are different from independent development. Both involve focusing on the patented invention and attempting to appropriate its valuable features. The difference between copying and designing around is often a matter of degree, depending upon whether one succeeds or not in getting far enough away from the claims to avoid a finding of infringement. Both, however, have the claimed invention in mind and attempt to make as little change in the invention as possible to retain or improve on the properties of the invention, while avoiding infringement. But neither is to be confused with independent development.

Independent development is not, as the majority states, dependent upon lack of knowledge of the patented invention. This rarely happens in a world of instantaneous public information on new developments in just about every field. Inventors who engage in independent development almost always do so with knowledge of others' inventions, but they still try to make their own inventions. This is neither copying nor designing around.

Distance from the claims of a patent (the substantiality of the differences factor) and the history and purpose of one's product development (intent) are thus not synonymous, as the majority's linking of these issues would imply. One can make many changes such that there are substantial differences between its product and the claimed invention, while essentially copying the invention, and not have engaged in independent development. Such a "copier" might be considered to have designed around and not be held to be an infringer under the doctrine. Similarly, one can independently have developed a product that differs only insubstantially from the patented product and properly be held to infringe under the doctrine of equivalents. If the *Graver Tank* tests of substantiality, independent development, and copying are all to have meaning, they

must be considered separately, and not be compressed into one test.

While the majority states that intent, or "bad faith," is not part of the evaluation of infringement, it is part of the copying-independent development spectrum noted by the Supreme Court in *Graver*. One who attempts to copy another's product stands in different shoes as compared with someone who attempts to independently develop his own product, but ends up close to the claims of someone else's patent. This is surely a question of intent, and it tracks the Court's *Graver* analysis in considering whether to apply the doctrine to the case at hand. The whole purpose of the doctrine is to defeat piracy and to do justice to a patentee. A pirate is one who *intentionally* copies a patented product, making only the most minor change to avoid literal infringement. An innocent developer who unintentionally happens to come close to the claims of a patent should be treated differently. The whole tenor of *Graver Tank* is to make that distinction. This factor is also distinct from the question of the substantiality of the differences. Intent to misappropriate someone else's invention is the hallmark of a pirate, and intent must therefore not be excluded if a suitable judgment is to be made concerning the applicability of the DOE. Therefore, I believe it is the province of the court to balance all these factors to determine whether it is appropriate to apply the DOE under the circumstances of the case.

It may be feared that considering intent under the DOE may lead to inconsistent results as between two different defendants, one who copies and one who independently invents. This is not likely to occur. Even if there are multiple parties selling the same product, but differently situated regarding the way they came to the product, patentees who have lost against one such party are not likely to sue the other. Similarly, when an infringer has lost an equivalents case, another party is not

likely to persist in its commercial activity unless it has substantially better equities, in which case it deserves a different result. Moreover, it is parties who suffer the consequences of patent infringement, not products, and it is not inappropriate for different results to follow different behavior of different parties. The fact that intent is irrelevant in a literal infringement determination should not be controlling in a DOE situation. An accused infringer who is operating outside the claims of a patent is entitled to have its behavior considered differently from someone who is literally within the scope of the claims.

The pioneer status of the invention, not mentioned by the majority, is also not relevant to the substantiality of the differences between the invention and the accused device. However, it should be part of the DOE analysis. It has no relation to the differences between the claims and the accused device, being only a question of the impact of the patented invention in relation to the prior art at the time the invention was made. It was mentioned by the Court in *Graver* and must be considered when relevant. To the extent that the fact-finder endows a patented invention with the status of being pioneering, the more the application of the doctrine of equivalents is justified. Pioneers should be given more scope of protection than inventors in a crowded art. Competitors must stay further away to be safe.

It may be felt that the above framework is highly complicated. However, it includes little that the Supreme Court did not outline and rely on in *Graver*. Moreover, it makes sense. The substantiality of the differences factor is key, but the other factors are part of our law and meaningful. If one is to hold a party operating outside the literal scope of one's claims to be an infringer, contrary to the requirements of the statute, one has to be able to make a case incorporating the various elements

outlined by *Graver*. If the Supreme Court wishes to simplify the analysis, it is of course free to do so. We are not.³

III.

Finally, I agree with Judge Plager that applicability of the doctrine should be for the court, not the jury. A finding of infringement under the DOE should properly be viewed as:

the exception, . . . not the rule, for if the public comes to believe (or fear) that the language of patent claims can never be relied on, and that the doctrine of equivalents is simply the second prong of every infringement charge, regularly available to extend protection beyond the scope of the claims, then claims will cease to serve their intended purpose.

London v. Carson Pirie Scott & Co., 946 F.2d 1534, 1538, 20 USPQ2d 1456, 1458-59 (Fed. Cir. 1991). See also *Coleco Indus., Inc. v. United States Int'l Trade Comm'n*, 573 F.2d 1247, 1258, 197 USPQ 472, 481 (CCPA 1978) ("The doctrine is an exception to the rule that patentees are limited to what they claim and is not applied in every case.") (Rich, J., concurring). Under a proper application of these factors, the DOE should be applied only in unusual cases, to frustrate piracy. The fact-finder should principally be focused on claims, as impliedly required by 35 U.S.C. § 112. Otherwise, the meaning of the claims is diminished, contrary to the statutory scheme that a patent specification shall conclude with

³ In fact, in light of *Graver*, it may be that only the Supreme Court, writing without the confining strictures of *Graver*, can deal cleanly with this issue. Among the reasons why the bench and bar have struggled so much and so long to define the DOE are the ambiguity of the *Graver* opinion, the fact that many of today's patent cases are tried to juries and the *Graver* case did not involve a jury, and the greater complexity of today's patented high technology inventions compared with those made 50 or more years ago. Thus, *Graver* speaks to a time that is long past.

claims that particularly point out and distinctly claim the invention.

In making this applicability determination, the court must exercise discretion in weighing the relevant factors. This sounds like a task for a judge, an equitable determination, rather than a question for a jury. I recognize that Supreme Court case law has not reserved determination of infringement under the doctrine to the judge. *Graver* states that infringement is a question of fact, arguably meaning that it is triable to a jury. The Court, although not recently, has reviewed jury cases involving the doctrine and seemingly endorsed leaving its application to the jury. See *Royer v. Schultz Belting Co.*, 135 U.S. 319, 325 (1890); *Winans v. Denmead*, 56 U.S. (15 How.) 330 (1854).

However, the Court has not ruled in modern times, under our current practice of relying on statutory claims, as to whether the question of the applicability of the doctrine, with all the factors it outlined, must be tried to a jury when properly requested. *Graver*, the Court's most recent pronouncement on the doctrine, did not involve a jury. In addition, I am not aware of any Supreme Court equivalents case in the last century that involved review of a jury verdict of infringement under the DOE. Most Supreme Court cases prior to *Graver* involved review of cases brought as bills in equity prior to the merger of law and equity. See, e.g., *Sanitary Refrigerator Co. v. Winters*, 280 U.S. 30 (1929); *Continental Paper Bag Co. v. Eastern Paper Bag Co.*, 210 U.S. 405, 414-15 (1908). Moreover, older Supreme Court cases involving the DOE that were brought at law, see, e.g., *Royer*, 135 U.S. at 319, *Winans*, 56 U.S. (15 How.) at 330, involved patents which issued before the statutory requirement of claims that particularly and distinctly claim the invention. Act of July 7, 1870, § 26, 16 Stat. 201; see also *Pennwalt*, 833 F.2d at 957-59, 4 USPQ2d at 1758-60 (discussing the evolutionary role of claims in United States patent

law). Thus I believe that it is not foreclosed to us to clarify the law by outlining the proper functions of the judge and jury in applying the doctrine of equivalents.

I consider that the DOE is an equitable remedy for the judge to decide whether to apply, or not to apply, perhaps after the jury has made factual findings as to all the relevant factors which the *Graver* opinion outlines.⁴ I believe that this judgment, one of suitability or appropriateness, requires weighing all the relevant factors, given any jury determinations concerning those factors. They include the substantiality of the differences, to which FWR is relevant; the copying-independent development spectrum, to which intent is relevant; the pioneering nature of the patented invention, if applicable; and others. The judge needs to decide whether, given the purpose of the doctrine to defeat piracy, a party who is more of a copier than an independent developer, has made only insubstantial changes in the claimed invention, such that, in light of all the other factors, it is appropriate to find that party to be an infringer even though its activities are literally outside the scope of the patent claims.

I would vacate the judgment of the district court and remand for a reevaluation of the question of infringement under the doctrine of equivalents consistent with the above analysis.

⁴ Application of these factors under the DOE is especially suited to the use of special verdicts and interrogatories under FED. R. Civ. P. 49.

NIES, *Circuit Judge*, dissenting, with whom Archer, *Chief Judge*, joins Part IV, Sections C2- 4, D, and E.

I dissent. I concur in Judge Plager's dissent on the issue of infringement to the extent of his eloquent statement of the problem. However, I conclude that the determination of infringement under the "Doctrine of Equivalents," as articulated in *Graver Tank & Mfg. Co. v. Linde Air Products Co.*, 339 U.S. 605, 85 USPQ 328 (1950) (*Graver II*), and prior Supreme Court precedent presents a series of questions of law, fact, and mixed law and fact. The meaning of the words in the claim must be defined by the court, a question of law. Also, the scope of protection which may be given the claim beyond its words is a question of law. In addition, the accused product or process must meet the limitations of the claim as defined by the court either literally or by equivalent means or steps, questions of fact.

Even though the ultimate finding of infringement is one of fact, once the words of the claim are interpreted and the elements of the accused product or process have been determined, "the correct application of the rule of equivalency" resolves itself into a question of law, whether trial is to the bench, *Sanitary Refrigerator Co. v. Winters*, 280 U.S. 30, 36 (1929), or to the jury, *Singer Co. v. Cramer*, 192 U.S. 265, 275 (1904). In this jury trial, the district court erred in denying the defendant's motion to direct a verdict in its favor. No infringement can be found as a matter of law upon a correct application of the doctrine of equivalents.

No matter what theory one espouses for the application of the doctrine of equivalents, fact, equity, law, or a combination thereof, infringement cannot be found in this case. To hold that the process of Warner-Jenkinson infringes violates the basic tenet that "courts have no right to enlarge a patent beyond the scope of its claim as allowed by the Patent Office." *Minerals Separation v. Butte & Superior Mining Co.*, 250 U.S. 336, 347 (1919).

The doctrine of equivalents, as applied to a claim to a method embodying a series of steps, at most allows substitution of an equivalent step, within the boundaries of the invention as marked out by the claim. Here, there is no substitution of steps which are mere equivalent variants of those required. Hilton Davis must push out the metes and bounds of the area it claimed as its property to ensnare Warner-Jenkinson. A red house has not been painted blue. Rather, the front and back lot lines marked by the word fence of the claim have been moved to take in the adjoining property. Absent this enlargement, Warner-Jenkinson cannot be found an infringer. This expansive view is a misuse of the doctrine of equivalents. Further, prosecution history estoppel applies to specifically restrict one element of the claim in issue.

This appeal raises the basic question of a right to a jury trial on the issue of patent validity, which cries out for resolution. But, assuming that the jury has the role of resolving underlying factual issues, the district court's instructions to the jury were defective. The district court invited guidance from this court on how to use a jury in a patent case. We have not accepted the plea. The entire case, not merely the issue of infringement, was taken *in banc*.¹ I dissent from the order of the *in banc* court assigning the validity issue to the original panel.

I.

BACKGROUND

Both Warner-Jenkinson and Hilton Davis manufacture dyes known as FD&C Red #40 and FD&C Yellow #6 which are used as colorants principally in foods, drugs, and cosmetics. The '746 patent claims a process for preparing dyes by subjecting their aqueous reaction mix-

¹ See *Asherman v. Meachum*, 957 F.2d 978, 983-85 (2nd Cir. 1992), for conflicting views on the propriety of this procedure under 28 U.S.C. § 46 and Fed. R. Civ. P. 35(a).

tures to ultrafiltration under conditions that cause impurities to separate from the reaction mixture, yielding a high purity dye product.

Claim 1 is in Jepson format.² Diazotization reactions to make the subject dyes have been used for many years.

² In a Jepson claim, the preamble before the words "wherein the improvement comprises" recites what is old in the art. The invention of the applicant follows those words. See 2 D. Chisum, PATENTS, § 8.06[1][c]; *Ex parte Jepson*, 1917 C.D. 62, 243 O.G. 525 (Ass't Comm'r Pat. 1917).

Claim 1, the only independent claim found to be infringed, reads:

1. In a process for the purification of a dye selected from the group consisting of the disodium salt of 1-[(6-methoxy-4-sulfo-3-methylphenyl)azo]-2-naphthol-6-sulfonic acid, the disodium salt of 1-[(4-sulfophenyl)azo]-2-naphthol-6-sulfonic acid, the trisodium salt of 1-[1-(4-sulfonaphthyl)azo]-2-naphthol-3,6-disulfonic acid, the disodium salt of 2-[1-(4-sulfonaphthyl)azo]-1-naphthol-4-sulfonic acid and the sodium salt of 2-(2-quinoyl)-1,3-indanedione-sulfonic acid as the products resulting, respectively, from the diazotization of 5-methoxy-2-methylsulfanilic acid in water with sodium nitrite in the presence of hydrochloric acid followed by the coupling under alkaline conditions of the resulting 5-methoxy-4-sulfo-2-methylphenyldiazonium chloride with sodium 2-naphthol-6-sulfonate; the diazotization of sulfanilic acid in water with sodium nitrite in the presence of hydrochloric acid followed by the coupling under alkaline conditions of the resulting 4-sulfophenyldiazonium chloride with sodium 2-naphthol-6-sulfonate; the diazotization of 4-aminonaphthalene-1-sulfonic acid in water with sodium nitrite in the presence of hydrochloric acid followed by the coupling under alkaline conditions of the resulting 1-sulfonaphthyl-4-diazonium chloride with disodium 2-naphthol-3,6-disulfonate; the diazotization of 4-aminonaphthalene-1-sulfonic acid in water with sodium nitrite in the presence of hydrochloric acid followed by the coupling under alkaline conditions of the resulting 1-sulfonaphthyl-4-diazonium chloride with sodium 1-naphthol-4-sulfonate; and the condensation of 2-quinaldine with phthalic anhydride followed by sulfonation of the resulting 2-(2-quinolyl)-1,3-indanedione, said dye being present in the resulting reaction mixtures, along with impurities, the improvement which comprises:

[Continued]

The mixtures resulting from diazotization and coupling reactions contain impurities which must be removed to meet FDA specifications. For many years, both Warner-Jenkinson and Hilton Davis purified the dye solutions by a process known as "salting out." This process produced what is called a press cake. Besides being labor intensive, this process had the disadvantages of the expense of the salt, disposal of the brine, and dye loss.

A third party, Osmonics, Inc., was known to specialize in the development of membranes and equipment for fluid purification by ultrafiltration. On July 9, 1982, Dr. Solter, then manager of research and development for the defendant, Warner-Jenkinson, instructed his engineering manager to contact Osmonics and have Osmonics process two of their dye preparations, including FD&C Red #40. Osmonics performed the tests on August 17, 18, and 19, 1982, using its standard ultrafiltration process with various standard Osmonics membranes it selected as appropriate for the size of the molecules to be filtered. Osmonics' standard membranes had a pore size range of 4 Angstroms

² [Continued]

[a] subjecting an aqueous solution of the reaction mixture resulting from said coupling or said sulfonation

to ultrafiltration

[b] through a membrane having a nominal pore diameter of 5-15 Angstroms

[c] under a hydrostatic pressure of approximately 200 to 400 p.s.i.g.,

[d] at a pH from approximately 6.0 to 9.0,

to thereby cause separation of said impurities from said dye, said impurities of a molecular size smaller than the nominal pore diameter passing into the permeate on the downstream side of said membrane and said dye remaining in the concentrate, and when substantially all said impurities have been removed from said concentrate, as evidenced by their essential absence in said permeate, recovering said dye, in approximately 90% purity from said concentrate by evaporation of said concentrate to dryness.

(Alphabetic designations, paragraphing and emphasis added.) The dependent claims need not be considered separately in this case.

to 20 Angstroms, a pH range of from 2 to 8½ or 9, and a pressure range of 100 p.s.i.g. to 800 p.s.i.g. Despite successful indications, Warner-Jenkinson did not immediately continue with the project for FD&C Red #40, but worked on other dyes not covered by the claims. Some years later after work on improvement of the Red #40 dye chemistry for filtration purposes, after investigating various vendors of ultrafiltration equipment, Warner-Jenkinson went forward with commercial use of the process, utilizing Osmonics equipment. Such equipment was installed in February 1986 and Warner-Jenkinson was in commercial production, prior to being charged with infringement.

In 1982, Hilton Davis, like Warner-Jenkinson, also decided to investigate a substitute for the salting out process and hired Dr. Wayne Cook to head the project. Neither Dr. Cook, nor anyone else on the Hilton Davis project, was knowledgeable in filtration techniques. Dr. Rebhahn suggested *dialysis* techniques be used and disclosed the location of an old unused Osmonics device which Hilton Davis had on hand. Dr. Cook then called Osmonics to see if Osmonics could solve his problem. Upon receiving a favorable reply, and just *after* Warner-Jenkinson contacted Osmonics, Dr. Cook hired Osmonics to test Hilton Davis' Red #40 dye solutions. Osmonics did not use dialysis,³ but used the ultrafiltration process it had used for Warner-Jenkinson, except Osmonics hydrolyzed the membrane to a greater extent to achieve Hilton Davis's economic goals by achieving faster results. The tests took place on August 24-26, 1982, one week after the tests for Warner-Jenkinson, and further tests were conducted on October 27-29, 1982. A third test was run later on Hilton Davis' Yellow #6 dye.

³ *Dialysis* is quite unlike ultrafiltration. Dialysis utilizes a membrane separating two solutions having different concentrations, and works on the principle of diffusion (i.e. no applied pressure). See Ulrich Baurmeister, *ENCYCLOPEDIA OF CHEMICAL TECHNOLOGY*, Vol. 8 at 58-59 (Mary Howe-Granted., 4th ed. 1993).

On the basis of the test results, Hilton Davis filed a patent application in the names of Drs. Cook and Rebhahn on March 28, 1983, covering the ultrafiltration process for certain dyes. In response to rejections, in November 1984, a second (CIP) application was filed, changing various process parameters. After further amendments to overcome cited prior art, the '746 patent issued on December 24, 1985.

In mid-October 1986, Warner-Jenkinson learned of the '746 patent through a reference to it in technical literature. It was unaware before then that Hilton Davis had developed a process similar to the one Warner-Jenkinson was using. On October 12, 1987, Warner-Jenkinson obtained an opinion of patent counsel: (1) that the patent was invalid for obviousness in view of a prior publication of ultrafiltration processes by Osmonics; and (2) that Warner-Jenkinson's process, which was conducted under process limitations *outside* the ranges set forth in the '746 claims, did not infringe literally or under the doctrine of equivalents.

Sometime later Hilton Davis tested a sample of Warner-Jenkinson's dye and, upon analysis, concluded that it appeared to be prepared by ultrafiltration. It is not possible to tell from the dye what process was used. Representatives of Hilton Davis and Warner-Jenkinson happened to meet in December of 1989, at which time Hilton Davis indicated that it might bring suit against Warner-Jenkinson on the '746 patent. Warner-Jenkinson denied infringement. Without further communication, Hilton Davis brought the instant suit a year later on April 1, 1991.

Trial was to a jury. Warner-Jenkinson defended on the ground of noninfringement and various grounds of invalidity. Throughout the trial, by summary judgment and JMOL motions and by objection to the court's instructions, Warner-Jenkinson urged that the issue of infringement under the doctrine of equivalents should not be submitted to the jury but on the record had to be

decided by the court in its favor as a matter of law and/or equity. Respecting validity, Warner-Jenkinson also objected to giving the jury special verdicts requiring answers to ultimate legal issues. It lodged formal objections against the court's instructions which required the jury to decide, for example, obviousness. The court overruled Warner-Jenkinson's various objections to its proposed instructions and sent the case to the jury for answers to nine special verdicts covering the issues of obviousness, inventorship, best mode, willfulness, damages and infringement under the doctrine of equivalents. The jury returned verdicts in favor of Hilton Davis on Warner-Jenkinson's defenses. The jury further found the infringement was not willful and awarded \$3,546,705 on Hilton Davis's claim. The district court entered judgment in accordance with the verdicts, denying Warner-Jenkinson's renewed motion for judgment as a matter of law (JMOL). A final judgment awarding damages and a permanent injunction were entered. Warner-Jenkinson appeals both validity and infringement issues. Hilton Davis did not appeal.

II.

STANDARD OF REVIEW

To overturn a jury verdict on an ultimate issue of fact, the party against whom the verdict was rendered must satisfy either prong of the following test:

(1) that the jury's findings of disputed material factual issues, implied or express, are not supported by substantial evidence or,

(2) that the findings do not support the verdict under the applicable legal standards.

Markman v. Westview Instruments, Inc., 52 F.3d 967, 975-76, 34 USPQ2d 1321, 1326 (Fed. Cir. 1995) (*in banc*); *Read Corp. v. Portec, Inc.*, 970 F.2d 816, 821, 23 USPQ2d 1426, 1431 (Fed. Cir. 1992); *Shatterproof Glass Corp. v. Libbey-Owens Ford Co.*, 758 F.2d 613, 618-619,

225 USPQ 634, 636 (Fed. Cir.), *cert. dismissed*, 474 U.S. 976 (1985); *Railroad Dynamics, Inc. v. A Stucki Co.*, 727 F.2d 1506, 1513, 220 USPQ 929, 936 (Fed. Cir.), *cert. denied*, 469 U.S. 871 (1984).

The "substantial evidence" standard of the first prong raises the question whether the jury's resolution of a factual dispute was reasonable. *See Dana Corp. v. IPC Ltd. Partnership*, 860 F.2d 415, 417, 8 USPQ2d 1692, 1694 (Fed. Cir. 1988), *cert. denied*, 490 U.S. 1067 (1989). In determining reasonableness, the trial court cannot assess the weight of conflicting evidence, pass on the credibility of the witnesses, or substitute its judgment for that of the jury. *See Perkin-Elmer Corp. v. Computervision Corp.*, 732 F.2d 888, 893, 221 USPQ 669, 673 (Fed. Cir.), *cert. denied*, 469 U.S. 857 (1984); *Railroad Dynamics Inc.*, 727 F.2d at 1512-13, 220 USPQ at 936. A finding of fact must stand unless the court concludes that on the entirety of the evidence of record, viewed in the light most favorable to the nonmovant and taking into account the required quantum of proof, no reasonable juror could have made the finding. *Read Corp.*, 970 F.2d at 821, 23 USPQ2d at 1431.

The second prong of the JMOL standard requires the court to apply the correct legal standard for liability to the established and undisputed facts. The movant must convince the court that the proper legal standard, as applied to that set of facts, does not support the verdict as a matter of law. *Boyle v. United Technologies Corp.*, 487 U.S. 500, 513-14 (1988) (citing *St. Louis v. Praprotnik*, 485 U.S. 112, 118-120 (1988) (plurality opinion)); *Ebker v. Tan Jay Int'l Ltd.*, 739 F.2d 812, 825-26 n.17 (2d Cir. 1984) (Friendly, J.); and 9 C. Wright & A. Miller, *Federal Practice and Procedure* § 2537, pp. 599-600 (1971)); *Structural Rubber Prod. v. Park Rubber Co.*, 749 F.2d 707, 717, 223 USPQ 1264, 1271-72 (Fed. Cir. 1984); *Dana Corp.* 860 F.2d at 417-18, 8 USPQ2d at 1694-95. On appeal, to determine the correctness of the district court's ruling on JMOL, the

appellate court applies the JMOL standard anew to the issues presented by the appeal. *Read Corp.*, 970 F.2d at 821, 23 USPQ2d at 1431. See also, *Newell Cos. v. Kenney Mfg. Co.*, 864 F.2d 757, 762, 9 USPQ2d 1417, 1421 (Fed. Cir. 1988), *cert. denied*, 493 U.S. 814 (1989).

Where an ultimate issue of law based on underlying disputed facts, e.g. obviousness of a patent, is submitted to a jury, our precedent holds that the same standard applies. *Jurgens v. McKasy*, 927 F.2d 1552, 1557, 18 USPQ 1031, 1035 (Fed. Cir. 1991).

III.

VALIDITY

I dissent from the assignment of the issue of validity to a panel for decision. The Supreme Court has clearly stated that between infringement and validity, "validity has the greater public importance." *Cardinal Chemical Co. v. Morton Int'l, Inc.*, 113 S. Ct. 1967, 1977, 26 USPQ2d, 1721, 1729 (1993); *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 330 (1945). In my view, the *in banc* court should resolve the important issues raised herein respecting the trial of validity issues before a jury. Our precedent is unclear, if not conflicting.⁴

A. Right to a Jury Trial

The defendant Warner-Jenkinson raised the defense of invalidity of the '746 patent on various statutory grounds. Over the objection of Warner-Jenkinson, these issues were submitted by "special verdicts" to the jury with general

⁴ The trial court opined, "Certainly if the Federal Circuit desires, they can instruct the District Courts of the country how to try patent cases to a jury in this vehicle if they choose to do so." We have left it in a mess. I would require at least *instructions* on what facts are in dispute, as was done historically. The instructions in early jury trials were fact specific. See Appendix to Validity.

instructions on the law applicable to the legal questions. The jury returned with verdicts *inter alia* that claims 1, 2, 3, 13, and 14 were not proved invalid on any of the asserted grounds, namely (1) that the claimed invention would not have been obvious within the meaning of § 103; (2) that employees of Osmonics, rather than the named inventors, Drs. Cook and Rebhahn, invented all or a portion of the claimed invention (see § 102); and (3) that the inventors did not violate § 112 by failing to disclose a better mode of carrying out the invention than that set forth in the specification of the patent. Each of these issues is one of law, not fact, although based, of course, on underlying facts. The trial court denied Warner-Jenkinson's renewed motion for JMOL on these issues.

On appeal, Warner-Jenkinson argues that the validity of a patent is an issue of law, and that a new trial is required because the jury resolved the questions of obviousness, best mode, and inventorship, all of which are questions of law to be decided by the judge. I agree that Hilton Davis had no constitutional right to a jury trial on these issues for the reasons set out in my opinion in a case on which the Supreme Court has granted certiorari. *In re Lockwood*, 30 USPQ2d 1292 (Fed. Cir. 1994), *vacated, reh'g granted, and reh'g in banc denied*, 50 F.3d 966, 33 USPQ2d 1406 (1995), 33 USPQ2d 1907 (Fed. Cir. 1995) (*Nies, J., dissenting from denial of rehearing in banc*), *cert. granted sub nom. American Airlines, Inc. v. Lockwood*, 115 S. Ct. 2274 (1995). Essentially, validity is an issue of law because patent rights are public rights, not private rights, and historically cancellation of a patent for invalidity was an equitable remedy. It is also my understanding that the denomination of an issue as one of law means that the judge resolves any factual issues, not the jury. *St. Louis v. Praprotnik*, 485 U.S. 112, 124-126 (1988) (plurality). I will limit my analysis to the obviousness issue.

The right to a jury trial on validity is critical to determining trial procedures and the standard for appellate

review. Prior to the creation of this court, the other circuits were in conflict on the issue of how to treat the ultimate question of obviousness. Some circuits considered obviousness a question of law for the court. *Julie Research Lab., Inc. v. Guildline Instruments, Inc.*, 501 F.2d 1131, 1135-36, 183 USPQ 1, 4-5 (2nd Cir. 1979) ("The ultimate decision of invalidity/validity for obviousness/nonobviousness is one law."); *Blohm & Voss AG v. Prudential-Grace Lines, Inc.*, 489 F.2d 231, 245, 180 USPQ 165, 176 (4th Cir. 1973) ("Thus, we come to the ultimate legal question of validity, and it is clear that it is, in the final analysis, a question of law."), *cert. denied*, 419 U.S. 840 (1974); *Dual Mfg. & Eng'g v. Burris Indus., Inc.*, 619 F.2d 660, 662-663, 205 USPQ 1157, 1160-1161 (7th Cir.) (*in banc*) (obviousness is a question of law), *cert. denied*, 449 U.S. 870 (1980). At least one circuit disagreed, concluding that obviousness presented a question of fact. *Plastic Container Corp. v. Continental Plastics of Oklahoma*, 708 F.2d 1554, 1558, 219 USPQ 26, 29 (10th Cir. 1983) ("The Tenth Circuit treats the ultimate issue of obviousness as a question of fact subject to the 'clearly erroneous' standard of review.").

In the Ninth Circuit, a slightly different practice evolved. There, district courts were permitted to give the issue of obviousness (a question of law) to the jury, but only for an advisory verdict. *Garter-Bare Co. v. Munsingwear Inc.*, 723 F.2d 707, 710-711, 221 USPQ 751, 753 (9th Cir.) (court, in accepting jury verdict as advisory only, acted within its right in exercising duty to determine obviousness as a matter of law), *cert. denied*, 469 U.S. 980 (1984); *Automation Electronics Corp. v. Sanders Instruments, Inc.*, 704 F.2d 1133, 1134, 218 USPQ 200, 201 (9th Cir. 1983) ("Although the issue [of obviousness] may be submitted to the jury for a non-binding advisory opinion, it is the trial court's responsibility to make the final determination independent of the jury's recommendation.").

This court recently held in *Lockwood, supra*, that the issue of validity of a patent *must* be given to the jury as a matter of constitutional right.⁸ A jury may be asked only the ultimate question of obviousness and, on JMOL, the judge must presume that the jury resolved all factual disputes in favor of the verdict winner. Warner-Jenkinson objects to that procedure. I would at least hold this appeal pending the decision of the Supreme Court in the *Lockwood* case.⁹

B. Jury Instructions

Even following the *Lockwood* precedent that a jury decides the facts underlying questions of validity, I would hold that the instructions on validity in this case are fatally defective to achieve that purpose.

As an initial matter, the first step in determining validity or infringement is to interpret the claims in issue. *Lemelson v. General Mills, Inc.*, 968 F.2d 1202, 1206, 23 USPQ2d 1284, 1287 (Fed. Cir. 1992), *cert. denied*, 113 S. Ct. 976 (1993). Furthermore, claims must have the same meaning and scope for both purposes. *Intervet America, Inc. v. Kee-Vet Lab. Inc.*, 887 F.2d 1050, 1053, 12 USPQ2d 1474, 1476 (1989); *Smithkline Diagnostics, Inc. v. Helena Lab. Corp.*, 859 F.2d 878, 882, 8 USPQ2d 1468, 1471 (Fed. Cir. 1988); *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 842 F.2d 1275, 1279, 6 USPQ2d 1277, 1280 (Fed. Cir. 1988). We have recently held as an *in banc* court that the district court must interpret the claims in its instructions to the jury. *Markman v. Westview*, 52 F.3d 967, 981-982, 34 USPQ2d 1321, 1331

⁸ This moots the question whether 35 U.S.C. § 281, providing the remedy of a "civil action" for patent infringement, provides a statutory right to a jury trial on the issue of validity.

⁹ If the *Lockwood* case is dismissed by the Supreme Court on *Lockwood's* pending motion, this appeal presents another vehicle for determining jury trial rights on the issue of validity. This is one of the few cases where a party has lodged proper objections.

(Fed. Cir. 1995) ("the trial court . . . should have instructed the jury as to the meaning of the claims"). The district court did not do so here. Under *Markman*, the error of a trial judge in failing to so instruct the jury was rendered harmless by that court's ruling on JMOL. *Id.* The same is not true here. Further, the district court ruled that an opinion of an "expert" on the meaning of the claim is fact evidence to be "weighed" by the jury in making their interpretation. Under *Markman*, such treatment of opinion testimony is improper by judge or jury. *Id.* at 983; 34 USPQ2d at 1332-33. The district court gave the following instruction to the jury:

The language of the Hilton Davis patent claims must be construed as it would be by those of ordinary skill in the art. In understanding the meaning of words used in the claims, you may consider the patent specification, the prosecution history of the patent, other claims of the patent, testimony of expert witnesses, the circumstances surrounding the inception of the patent application and the meaning of words as contained in technical literature which are part of the legal evidence and the state of the prior art.

This is an abdication of the court's responsibility. Without knowing the meaning given to the claim language by the jury, the correctness of a validity or infringement verdict cannot be meaningfully reviewed. The jury may simply have misconstrued the claim, for example, determining where pressure must be measured.

The special verdicts requested from the jury were not fact verdicts under Rule 49(a) of the Federal Rules of Civil Procedure.⁷ As noted in *Roberts v. Sears, Roebuck*

⁷ Rule 49(a) of the Federal Rules of Civil Procedure recites in pertinent part:

(a) Special Verdicts. The court may require a jury to return only a special verdict in the form of a special written finding upon each issue of fact. . . .

& Co., 723 F.2d 1324, 1340, 221 USPQ 504, 519 (7th Cir. 1983) (*in banc*):

In this case the directions of *Dual* were not followed. The verdict form utilized was "special" only in the sense that the legal issue of patent validity was broken down into the components of obviousness and anticipation. Proper special verdicts, however, are to be addressed only to the subsidiary questions of fact that compose the *Graham* tripartite inquiry upon which the legal determination of validity must rest, not to the obviousness and anticipation components of patent validity themselves.

The district court here gave instructions which treated the validity issues as ultimate facts. For example, the court instructed:

The defendant has the burden of establishing the invalidity of the patent by clear and convincing proof.

I would hold that instruction to be plain error. The issue of obviousness is a conclusion drawn after facts are established. Resolution of the facts merely brings one to the legal question, not its answer, which is a judgment call. *Newell Co. v. Kenney Mfg. Co.*, 864 F.2d 757, 762, 9 USPQ2d 1417, 1421 (Fed. Cir. 1988) ("[W]here the only issue is, as here, the application of the statutory standard of obviousness (35 U.S.C. § 103) to an established set of facts, there is only a question of law to be resolved by the judge."), *cert. denied*, 493 U.S. 814 (1989). *Accord Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1566-67, 1 USPQ2d 1593, 1596-97 (Fed. Cir.), *cert. denied*, 481 U.S. 1052 (1987). A correct instruction would be that disputed facts underlying the legal conclusion of invalidity must be established by clear and convincing evidence.

The entirety of the instruction on obviousness appears as an Appendix to this section. The instructions refer to

a number of difficult concepts without tying them to any factual dispute or evidence in this case. The jury was literally put to sea without navigational aid. It was repeatedly told it was the judge of the obviousness of the invention. As an example, I quote one paragraph, which in the context of the entirety of the instructions carries the same or greater force:

To reach a proper conclusion, you must step backward in time and into the shoes worn by that hypothetical person when the invention was unknown and just before it was made. You must then determine, in light of all the legal evidence, whether the patent challenger has convincingly established that the claimed invention as a whole would have been obvious at the time to that hypothetical person.

The instructions on obviousness could only have been gibberish to a lay jury. The instructions did not tell the jury what fact issues, if any, were in dispute which the jury must decide. An appellate court cannot provide proper appellate review on the basis of such general instructions. See *Roberts*, 723 F.2d at 1341, 221 USPQ at 519 (requiring instructions setting forth mandatory alternative verdicts).

These examples are sufficient to show that the instructions and special verdicts on validity issues in this case are fatally flawed. The ultimate decision on the validity of a patent should not be thrown into the black box of a jury to be reviewed under the substantial evidence standard. *Structural Rubber*, 749 F.2d at 718, 223 USPQ at 1272.⁸ If the judge decides that resolution of a particular fact issue settles the validity question, the judge needs to direct the jury to decide that fact issue in a special verdict

⁸ In *Structural Rubber*, there was no objection, as here, to trial of validity by either party. I would follow *Structural Rubber* where trial is to a jury by right or by agreement. 749 F.2d at 722-724, 223 USPQ at 1275-1277.

or must give mandatory alternative verdict instructions. As the *Roberts* court stated:

[A] compulsory instruction must be given when a general verdict is utilized: "[I]t is the court's duty to instruct the jury that it should return one verdict if the facts are found one way and a different verdict if the facts are found otherwise." [*Panther Pumps & Equipment Co. v. Hydrocraft, Inc.*, 468 F.2d 225, 175 USPQ 577 (7th Cir. 1972), cert. denied, 411 U.S. 965 (1973).] In other words, the jury must be instructed that if it finds facts A, B, C, and D, it must render a certain verdict. Anything less than strict adherence to this procedure by a trial court constitutes an abdication of its active duty to retain ultimate control over the issue of obviousness.

Roberts, 723 F.2d at 1341, 221 USPQ at 519. Here, there were no such instructions given. Meaningful review where there are material issues of fact is impossible. *Structural Rubber*, 749 F.2d at 723, 223 USPQ at 1276. Such error can be corrected only by a new trial. From the instructions in this case, it cannot be determined whether the jury decided against the defendant on the factual issues or the legal issues.

The trial court's ruling on the JMOL motion compounds the problem by its legally erroneous interpretation of the claim. The judge repeatedly stated that the inventors conceived a special process which skipped the salting out process and produced FDA certified quality dye, and determined obviousness on that basis. The claims do not require skipping the salting out step or producing FDA certifiable dye. Thus, the court's basis for distinguishing over the prior art is legally erroneous. Further, the court itself considered as *evidence* and relied on the *legal opinion* of a proffered expert witness [Dr. Kinman] that the invention was not obvious over prior art. This was error. *Mendenhall v. Cedarapids, Inc.*, 5 F.3d

1557, 1574, 28 USPQ2d 1081, 1096 (Fed. Cir. 1993), *cert. denied*, 114 S. Ct. 1540 (1994). The error in giving the issues of validity to the jury were not rendered harmless by the court's ruling on JMOL. Because of erroneous instructions, a new trial is required.

C. Conclusion

The judgment that the '746 patent was not invalid cannot stand. Regardless of what conclusion one might reach on the merits of the hotly contested issue of validity, particularly obviousness in view of Osmonics' work and publications before testing for either party, the more important question is: Was this issue properly tried? I dissent to the denial of *in banc* to resolve the jury trial issues raised by this appeal.

APPENDIX TO VALIDITY

Jury Instructions On Obviousness in this Case

A patent granted by the Patent and Trademark Office is invalid if the claimed subject matter as a whole would have been obvious to a person of ordinary skill in the pertinent art at the time the patented invention was made. Patentability shall not be negated by the manner in which the invention was made.

In determining obviousness of the claimed subject matter of each of the claims of the patent in suit, the following steps should be taken by you: One, you should determine the scope and content of the prior art relied upon against the patent in suit. Two, you should then identify the difference, if any, between each claim of the patent in suit and the prior art. And three, you should determine the level of ordinary skill in the pertinent art at the time the invention of the patent in suit was made.

You must make each of the determinations as to [sic] of the time the Hilton Davis invention was made.

You should consider such secondary considerations as commercial success, long-felt but unresolved need, failure of others to solve the problem and acquiescence in the patent by others.

The defendant Warner-Jenkinson must prove invalidity because of obviousness by clear and convincing legal evidence.

During the course of this trial you have heard the term "prior art" used frequently. One of Warner-Jenkinson's assertions in this case is that there were certain prior public disclosures which constitute prior art within the meaning of the law. The term "prior art" includes that which was: One, known or used by others in this country before the date of invention by inventor; or

Two, patented or described in a printed publication in this or a foreign country before the date of invention; or

Three, patented or described in a printed publication in this or a foreign country for more than one year prior to the date of the application herein; or

Four, publicly used or on sale in this country more than one year prior to the date of the application therefor; or

Five, made or built by another person before the date of the invention where the thing made or built was not abandoned, suppressed or concealed.

The scope of the prior art is defined as that reasonably pertinent to the particular problem with which the inventor was involved.

I previously instructed you that when the United States Patent Office grants a patent it is presumed that the patent examiner is correct. If a patent challenger contends that a patent is invalid but relies only upon the same prior art that the examiner considered in granting the patent, he asserts that the examiner was wrong, and the

presumption requires that he prove this by clear and convincing legal evidence.

If the patent challenger relies only on prior art, which is not more pertinent or relevant than the art considered by the examiner, then such challenger must also prove invalidity by clear and convincing legal evidence.

If the patent challenger relies upon prior art which was not considered by the examiner, and which is more pertinent than that which was considered, then invalidity must still be proved by clear and convincing legal evidence, however, the patent challenger may have an easier time doing so.

In determining whether or not the claims of the patent in suit would have been obvious at the time, it is not necessary that there be absolute predictability of the result. It is only required that there be a reasonable probability the beneficial result will be achieved to show obviousness.

In reaching your determination on the issue of obviousness, you should consider whether the subject matter of the invention was also developed independently by other persons either before the alleged inventors of the patent in suit or about the same time.

It is fundamental in patent law that one who applies a known process to a known chemical does not thereby invent an unobvious patentable process unless it produces a different or an unexpected result over the prior art. If you find that defendant Warner-Jenkinson has proved by clear and convincing legal evidence that the process contained in the patent was an existing process, that plaintiff simply applied it to an existing chemical for ultrafiltration, and that the process failed to produce a different or unexpected result over the prior art, then you must find that the patented process is obvious and that the plaintiff's patent claims are invalid.

There have been frequent references to a person having ordinary skill in the art. Such a person is only hypothetical. It is that person who is presumed to be aware of all the pertinent prior art. The actual inventor's skill is irrelevant to the inquiry. A person of ordinary skill in the art is also presumed to be one who thinks along the line of conventional wisdom in the art.

To reach a proper conclusion, you must step backward in time and into the shoes worn by that hypothetical person when the invention was unknown and just before it was made. You must then determine, in light of all the legal evidence, whether the patent challenger has convincingly established that the claimed invention as a whole would have been obvious at the time to that hypothetical person.

You are also to determine the level of ordinary skill in the art to which the claimed invention pertains at the time the claimed invention was made. Factors to be considered in determining the level of ordinary skill in the pertinent art are: The educational level and years of experience of the person or persons who you find to have developed the processes that are the subject of this case and of others working in the pertinent art, the types of problems encountered in the art, the teachings of the prior art, patents, and publications of other persons or companies, and the sophistication of the technology.

One of the considerations of obviousness is the difference between the pertinent prior art and the claims of the Hilton Davis patent. You must consider the claimed invention as a whole.

The differences may seem slight, but it may also have been the key to success and advancement in the art resulting from the invention.

Author's Note

Instructions in early jury trials were directed to the particular case, not to legal abstractions. *See, e.g., Coupe v. Royer*, 155 U.S. 565, 570-573 (1895); *Johnson v. Root*, 13 Fed. Cas. 823 (Cir. Ct. D. Mass. 1858); *Serrell v. Collins*, 21 Fed. Cas. 1085 (Cir. Ct. S.D.N.Y. 1857); *Page v. Ferry*, 18 Fed. Cas. 979 (Cir. Ct. E.D. Mich. 1857).

IV.

INFRINGEMENT

A. *Equivalents Under the Patent Act of 1952*

"When all else fails, read the statute." One cannot improve on this advice from a law school professor, now long deceased. The only reference to equivalents in the Patent Act of 1952, the current statute, appears in 35 U.S.C. § 112. As will become evident, this part of the statute reflects one facet of the judicially created doctrine of equivalents and it was the only part enacted into law by Congress.⁹ Section 112 reads in pertinent part (hereinafter § 112, ¶ 6):

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification *and equivalents thereof*. [Emphasis added.]

If a patentee chooses to draft a claim in other form, it is reasonable to conclude Congress intended that the pat-

⁹ The Department of Justice objected stating: "The section further introduces into the statute for the first time the controversial doctrine of equivalents without defining its scope." *Patent Law Codification and Revision: Hearings on H.R. 3760 Before Subcommittee No. 3 of the Committee on the Judiciary, 82nd Congress, 1st Sess. p. 95, (1951) (statement of T. Hayward Brown, Chief, Patent Litigation Unit, Claims Divisions, Department of Justice).*

entee should be bound by the literal language of the claim. In view of the liberality in current claiming practice, the need for the doctrine of equivalents because of difficulties in drafting claims to cover an invention in all possible forms is a rare case. If the invention can be claimed under § 112, ¶ 6, it should be so claimed so as to give notice that the inventor claims equivalents.¹⁰

In addition, the application of the doctrine of equivalents to a specific claim is suspect because of the statutory requirements enacted in 1952 for obtaining a broadened reissuance of a patent, which were much stricter than under prior statutes. Section 251 provides that a patentee seeking to broaden the claims of its patent must file for reissue within two years of the patent's issuance. Moreover, under § 252, the period of protection is prospective only for the balance of the original term, not retroactive to the date of issuance of the patent, with respect to activities which do not infringe a claim in the original patent. Competitors are, thus, protected from liability for damages for infringement of claims broadened on reissue by provisions recognizing their "intervening rights." P. J. Federico, *Intervening Rights in Patent Reissues*, 30 Geo. Wash. L. Rev. 603-637 (1961-62) (discussing intervening rights generally). This rational balanced system provided by Congress is undermined by the judicially created doctrine of equivalents. To draw a parallel to reissue, the asserted claims of the '746 patent must be broadened to capture the accused process here; these claims are broadened more than two years after issuance of that patent; and no intervening rights are provided for the innocent user of the broadened claims.

The patentee is much better off evading the reissue procedure which Congress has provided, and resorting

¹⁰ Section 112, ¶ 6 does not cover single element claims. Special consideration may attend infringement by equivalents in such cases.

to its counterpart, the doctrine of equivalents, created out of the judiciary's sense of "fairness." If we are to persist in an extra-statutory remedy, it should be as fair to *both sides* as that provided in the statute.

Prior to the current statute, the judiciary created *broadened reissues* of a patent extra-statutorily as a matter of fairness to patentees, *Miller v. Brass Co.*, 104 U.S. 350, 354 (1881), and later had to create the doctrine of intervening rights in fairness to infringers who had no notice in the time period between issuance and reissuance that their conduct would be held infringing. *Sontag Chain Stores Co. v. Nat'l Nut Co.*, 310 U.S. 281, 293-294 (1940). Congress then amended the statute in 1952 to incorporate both "fairness" parts for broadened reissues.

Today, the doctrine of equivalents is as unfair as broadened reissues of patent without intervening rights. Having created an extension of protection of a claim by the doctrine of equivalents, the judiciary should take it upon itself to establish intervening rights similar to those for claims changed on reissue. The *absence* of intervening rights has not been frozen statutorily. The doctrine is not in the current statute at all except in § 112 ¶ 6. At a minimum, damages should be limited.

B. *Infringement By Equivalents Under Graver II*

Inasmuch as I stand alone in advocating a straightforward interpretation of the current statute, I must accept, as I have in the past, that the doctrine of equivalents as enunciated in *Graver II*, continues to be viable. However, the *Graver II* doctrine was, in any event, misapplied in this case.

The jury was instructed:

Hilton Davis asserts that the Warner-Jenkinson process for making food dyes infringes the Hilton Davis patent under the doctrine of equivalents. The doctrine of equivalents exists to prevent a fraud on the patent.

The concept of the doctrine of equivalents is designed to protect the patent holder from an unscrupulous infringer who appropriates the invention but avoids the literal language of the claims. In this regard, consideration must be given for the purpose for which a step is used in the claims of the patent and in defendant's processes and the functions which they perform.

You may find infringement under the doctrine of equivalents when the accused process and the claimed invention perform substantially the same function in substantially the same way to yield substantially the same result even though the processes differ in name, form or shape.

Hilton Davis must prove infringement under the doctrine of equivalents by a preponderance of the legal evidence.

Though application of the doctrine of equivalents extends the protection of the patent beyond the literal words contained in the claims, it is not proper to erase the meaningful limitations of the claims on which the public is entitled to rely in avoiding infringement, and you must look to the claims section of the patent to determine the coverage and limitations of the patent.

The doctrine of prosecution history estoppel precludes a patent owner from obtaining a claim construction through the application of the doctrine of equivalents that would resurrect subject matter surrendered during prosecution of a patent application. That is not to say, however, that whenever a limiting amendment or argument is made during prosecution, the patent owner loses all coverage between what the claims literally cover and what they would have covered prior to the amendment or argument. A close examination must be made as to, not only what

was surrendered, but also the reason for such a surrender. The fact that claims were narrowed does not always mean that a patent owner is completely prohibited from recapturing some what was originally claimed. Depending on the nature and purpose of an amendment, it may have a limiting effect within a spectrum ranging from great to small to zero. Determination of the effect on the doctrine of equivalents from actions taken before the PTO requires consideration of the nature of such actions, the reasons therefore, the prior art distinguished, and the examiner's objection thereby overcome.

A patent owner cannot obtain, under the doctrine of equivalents, coverage which could not have been obtained from the PTO by literal claims. In making this determination, you should consider whether the Hilton Davis patent claims as a whole, when interpreted to cover the Warner-Jenkinson's processes, "read on" the prior art.

The district court entered judgment on the jury's verdict of infringement and denied a JMOL motion. The majority approves the instructions as the sum and substance of the doctrine of equivalents, relying on closing argument of counsel to flesh them out to include the test it adopts of limiting infringement to "insubstantial" changes, a test not in the instructions. Nothing can save these instructions, least of all attorney argument. If nothing else, the district court told the jury that it must apply the law as stated in the court's instructions.

The doctrine of equivalents is a much more complex concept than that set out in the jury instructions or in the majority opinion. The doctrine is comparable to the concept of determining fair use of a copyrighted work. The majority opinion recognizes some of the complexity but approves utter simplicity. The majority speaks of various factors that are important in finding infringement

by equivalency, but none of the restraints it suggests made it into the jury instructions. Warner-Jenkinson's wholly independent development of its process, for example, appears nowhere. Nor does the majority take them into account in affirming the judgment in this case.

The majority's analysis of infringement under the doctrine of equivalent does not "restate" the Supreme Court standard. The majority *in banc* has "revised" the doctrine to eliminate the legal safeguards that Supreme Court precedent had built into the doctrine's application to protect the public from unknowable infringement as here. Securing rewards to patentees may not override due process. Yet, the public's right to reasonable notice of prohibited conduct surfaces nowhere in the majority opinion. Contrary to the majority, the Supreme Court placed clear limitations on the legal scope of protection of a claim under the doctrine. As now defined by this court, a doctrine which rests on fairness has been made wholly arbitrary. The majority holds, first, that a patent inherently covers equivalents of the product or process regardless of how the invention is described in the specification or claim and, second, that infringement depends on finding as a fact that the changes in the accused product or process are "insubstantial."

From a review of Supreme Court precedent covering the doctrine under the predecessor statute, the determination of the scope of protection involves a judgment call by the district court that the words of the claim should or should not be controlling. The scope of a claim may be broader or narrower or the same as the words of a claim. But the scope can never be broader than the invention. That decision is, as Judges Plager and Lourie state, based in part on the equities but, in the past, the conclusion was not only made by the judge in equity but also at law. But whether made at law or in equity, the ultimate conclusion that the doctrine applies to a set of established facts has been subject to plenary review on appeal, as in *Graver II*.

Applying these principles to the present case, the district court erred in not determining the meaning and scope of the claim in suit. The question of scope is whether one of skill in the art would understand that a specific element of the claim is not the only means that may be used in the claimed invention. The answer depends on the nature of the invention, the claim language, the description of the invention in the specification, other claims in the patent, the arguments and amendments made during prosecution, the obviousness of the change, the prior art, the alleged infringer's own conduct, and any other circumstances from which notice that the literal words of the claim are not meant to control might be inferred. In addition to the court's determination of the range of equivalent components, the fact question of equivalency carries restrictions: (1) the doctrine of equivalents may not be used to enlarge a claim; infringement requires that every limitation of a claim must be met by at least an equivalent substituent in the accused product or process; (2) legal equivalency of a substituent is established by the knowledge in the art at the time the patent is issued, and (3) the substituent must perform essentially the same function as the element which it replaces so that overall the accused product or process and the claimed invention can be said to operate by substantially the same means to achieve the same or substantially the same result. These restrictions must be part of the jury instructions.¹¹

The majority entirely omits the step of determining whether, as a matter of law, an element of the claim extends to equivalents, a requirement of the Supreme Court after 1870. It contorts the doctrine to overall equivalency

¹¹ I leave open the question whether infringement can extend to a later developed substituent under § 112, ¶ 6. If so, there should be some restraint, such as, that one of skill in the art would find it obvious to make the change. This is not part of the *Graver II* test which limited legal equivalents to pre-issuance knowledge of equivalency.

to the claimed invention and further states that equivalency is found as of the time of the infringement. "Known" equivalency of a substituent at the time of the patent's issuance is no longer a requirement. Further, the finding of infringement is entirely a question of fact. With these departures from Supreme Court precedent, the doctrine has lost its moorings. I disagree with the majority's analysis. In particular, I conclude that infringement under the doctrine of equivalents under *Graver II*, like the doctrine of fair use of copyrighted works,¹² involves mixed questions of law and fact.

Prior Federal Circuit precedent has taken a generous view of the doctrine, making infringement by equivalents the automatic second step when literal infringement is not proved, as the majority reaffirms today.¹³ In addition, old and newly developed equivalents of an invention are covered by a claim even for an invention which was not a pioneer. *Hughes Aircraft v. United States*, 717 F.2d 1351, 212 USPQ 473 (Fed. Cir. 1983). Further, in *Hughes*, we engrafted the doctrine upon claims drafted in accordance with § 112, ¶ 6 leading to a bizarre interpretation of the statute. We now have literal equivalents and non-literal equivalents of claim elements. See, e.g., *Johnston v. IVAC Corp.*, 885 F.2d 1574, 1577, 1580-81, 12 USPQ2d 1382, 1386-1387 (Fed. Cir. 1989). We have made the infringement analysis so convoluted it is impossible for most district court judges untrained in "patentese" to follow, much less jurors. At least today's decision makes it simple—give the entire question of infringement under the doctrine to the jury under instructions which place

¹² See *Harper & Row Publishers, Inc. v. Nation Enters.*, 471 U.S. 539, 560 (1985); *Fisher v. Dees*, 794 F.2d 432, 436, 230 USPQ 421, 424 (9th Cir. 1986); *Maxtone-Graham v. Burtchell*, 803 F.2d 1253, 1258-59, 231 USPQ 534, 538 (2nd Cir. 1986).

¹³ The attempts by some judges to restrain it (see, e.g., *London v. Carson Pirie Scott & Co.*, 946 F.2d 1534, 20 USPQ2d 1456 (Fed. Cir. 1991)) have now been rejected.

the vaguest restraints on infringement by equivalency. I agree that a change should be made but not in that direction.

C. Historical Perspective

What is the "Doctrine of Equivalents"? What makes the doctrine so contentious? Simply stated, despite the statutory provisions that define infringement as the unauthorized making, using, or selling of a patented invention (35 U.S.C. § 271), and that require the inventor to "particularly point[] out and distinctly claim[] the subject matter which the applicant regards as his invention" (§ 112, ¶ 2), infringement may or may not be restricted under our jurisprudence to what the inventor sets out in the claims which define his invention. But with the extension of the legal protection for a patented invention beyond the literal words of the claims, the public's right to notice of what conduct is forbidden by a patent is compromised. How to balance these conflicting interests under the current statute and Patent Office procedures is a question the Supreme Court has not addressed.

1. Origin of the Doctrine

A review of the origins of the doctrine of equivalents is not merely interesting "filler" in this opinion. A prior decision respecting the doctrine of equivalents cannot be properly understood if the decision is divorced from the statutory and judicially imposed requirements for claim specificity, from examination procedures in the Patent Office applicable at the time to the patent in issue, and from the legal terminology of the period.

No mention of "claims" appears in the Act of 1790 or Act of Feb. 21, 1793, Ch. 11, 1 Stat. 318, and there was no procedure for administrative examination to determine patentability of an invention. Under these statutes, the invention merely had to be described so as to "distinguish [it from] other things before known" and "in the case of

a machine [to explain] the principle by which it may be distinguished from other inventions." See Karl B. Lutz, *Evolution of the Claims of U.S. Patents*, 20 J. Pat. Off. Soc'y 134 (Feb. 1938), 20 J. Pat. Off. Soc'y 377 (Apr. 1938), 20 J. Pat. Off. Soc'y 457 (May 1938). One who used the "essence" of the invention was an infringer. See *Odiorne v. Winkley*, (No. 10,432) 18 F. Cas. 581 (C.C. Mass., 1814).

Recognizing that the public should be informed by the patent document itself as to what was prohibited to them, the Supreme Court expressed a need "to put the public in possession of what the party claims as his own invention so as . . . to guard against prejudice or injury from the use of an invention which the party may otherwise innocently suppose not to be patented." See *Evans v. Eaton*, 20 U.S. (7 Wheat.) 356, 434 (1822).

In response to such judicial direction, the requirement for a claim to an invention first appeared in the Act of 1836. However, as interpreted by the Supreme Court, a claim under the 1836 Act did not limit the scope of protection.¹⁴ Under this claiming system, and there was generally only one claim, infringement continued as before to cover variations of the *described* embodiments. In essence, one continued to infringe the general *description* of the invention in the specification, not the specifics of the claim. See Ronald D. Hantman, *Doctrine of Equivalents*, 70 J. Pat. & Trademark Off. Soc'y 511, 516-37 (1988). In *O'Reilly v. Morse*, 56 U.S. (15 How.) 62, 123 (Jan. 30, 1853), the Supreme Court explained:

¹⁴ Section 6 of the statute recited, in pertinent part, that the inventor "shall particularly specify and point out the part, improvement, or combination, which he claims as his own invention or discovery." Patent Act of 1836, Ch. 357, 5 Stat. 117. A typical claim was a catalog of selected elements without explanation of how they interacted, merely followed by words such as "constructed and adapted to operate substantially as set forth." Ridsdale Ellis, *Patent Claims*, § 6 (1949).

It is a well settled principle of law, that *the mere change in the form* of the machinery (unless a particular form is specified as the means by which the effect described is produced) or *an alteration in some of its unessential parts; or in the use of known equivalent powers*, not varying essentially the machine, or its mode of operation or organization, will not make the new machine a new invention. It may be an improvement upon the former; but that will not justify its use without the consent of the first patentee. [Emphasis added.]

The "well settled" principle of law there stated was not only a test for determining whether an accused device was an infringement, but also a test for determining whether a patent was valid. Indeed, the doctrine of equivalents originated as a test for patentability. If the patented invention substituted a *known* equivalent for an element in a *known* process or product, merely varied the shape of a known product, or made other immaterial variations, the alleged invention was held to lack "invention", being "anticipated".¹⁵ Concomitantly, one did not avoid infringement by a mere change in form, by the substitution

¹⁵ Until 1952, the statutory test for patentability was "invention." R.S. § 4886. The term "anticipation" carried a broad meaning until the Patent Act of 1952. 66 Stat. 792. See, e.g., *Yale Lock Mfg. Co. v. Greenleaf*, 117 U.S. 554, 559 (1886) (claim "anticipated" because change over prior art device "would occur to rudest and most unskilled mechanic"); *Yale Lock Mfg. Co. v. Sargent*, 117 U.S. 536, 545-547 (1886); *Hotchkiss v. Greenwood*, 52 U.S. (11 How.) 248, 268-69 (1850); *The Corn-Planter Patent*, 90 U.S. (23 Wall.) 181, 220 (1874) (reviewed machines of different construction for anticipation).

As we have previously noted in *Argus Chem. Corp. v. Fibre Glass-Evercoat Co.*, 759 F.2d 10, 14 n.5, 225 USPQ 1100, 1102 n.5 (Fed. Cir.), cert. denied, 474 U.S. 903 (1985), the current meaning of "anticipation" is different. "Anticipation" now carries a narrower meaning, namely, that the invention lacks novelty. Under the current statute, any differences from a prior art device would be analyzed for "obviousness." 35 U.S.C. § 103. *Graham v. John Deere*, 383 U.S. 1 (1966).

of a *known* equivalent element in a patented combination, or by leaving out a "nonessential" part from a patented invention.¹⁶ *Prouty v. Draper, Ruggles & Co.*, 41 U.S. (16 Pet.) 336 (1842) (infringement); *Evans v. Eaton*, 16 U.S. (3 Wheat.) 454 (1818) (validity).

The conflict over the legitimacy of the doctrine as a test for infringement first surfaced in *Winans v. Denmead*, 56 U.S. (15 How.) 330 (1853), a 5-4 decision of the Supreme Court. The split in *Winans* was prompted by the Justices' differing interpretations of the statutory requirement that a claim to an invention be made in a patent. The claim of the *Winans* patent was directed to coal cars which were shaped "in the form of a frustum of a cone substantially as herein described." The party charged with infringement used an octagonal shape instead of a circle. The majority held:

It is generally true, when a patentee describes a machine, and then *claims it as described*, that *he is understood to intend to claim, and does by law actually cover, not only the precise forms he has described, but all other forms which embody his invention*; it being a familiar rule that, to copy the principle or mode of operation described, is an infringement, although such copy should be totally unlike the original in form or proportions.

.....

Patentees sometimes add to their claims an express declaration to the effect that the claim extends to the thing patented, however its form or proportions may be varied. But this is unnecessary. The law so interprets the claim without the addition of these words. The exclusive right to the thing patented is not secured, if the public are at liberty to make substantial copies of it, varying its form or proportions.

¹⁶ See Hantman, *supra*.

And, therefore, *the patentee*, having described his invention, and shown its principles, and claimed it in that form which most perfectly embodies it, *is, in contemplation of law, deemed to claim every form in which his invention may be copied, unless he manifests an intention to disclaim some of those forms.*

Id. at 342-43 (emphasis added).

Four Justices, in vigorous dissent, voiced a contrary view of the effect of the statutory claim requirement:

The patentee is obliged, by law, to describe his invention in such full, clear, and exact terms, that from the description the invention may be constructed and used. Its principle and modes of operation must be explained; and the invention [sic] shall particularly "specify and point" out what he claims as his invention. Fulness, clearness, exactness, preciseness, and particularity, in the description of the invention, its principle, and of the matter claimed to be invented, will alone fulfil the demands of Congress or the wants of the country. Nothing, in the administration of this law, will be more mischievous, more productive of oppressive and costly litigation, of exorbitant and unjust pretensions and vexatious demands, more injurious to labor, than a relaxation of these wise and salutary requisitions of the act of Congress. In my judgment, the principles of legal interpretation, as well as the public interest, require, that this language of this statute shall have its full significance and import.

Id. at 347.

The divergent views of the Justices in *Winans* are reiterated in the majority and dissenting opinions in *Graver II*, almost a hundred years later. The century-old debate over the function of patent claims has become crystallized under the rubrics of "central" claiming and

"peripheral" claiming. As explained in Ellis, *supra* note 14, at § 4:

There are two general methods of defining an invention—central definition and peripheral definition. Central definition involves the drafting of a narrow claim setting forth a typical embodiment coupled with broad interpretation by the courts to include all equivalent constructions. Peripheral definition involves marking out the periphery or boundary of the area covered by the claim and holding as infringements only such constructions as lie within that area.

The majority in *Winans* endorsed central claiming, subordinating *the claim* to the fuller description and the drawings of the invention contained in other parts of the patent. As under earlier statutes, one infringed the *material* parts of the invention "as described" in the *specification*. A claim was treated essentially as a preferred embodiment of the invention. It continued to be left to the courts to sift through the entirety of the patent description to determine what were the *material* elements embodying the "principle" or "essence" of the invention for both validity and infringement purposes.¹⁷ Even under

¹⁷ Throughout this period, patentability was treated as a question of fact in equity and at law. See, e.g., *Tucker v. Spalding*, 80 U.S. (13 Wall.) 453, 455 (1871) (jury trial); *Bischoff v. Wethered*, 76 U.S. (9 Wall.) 812, 814 (1869) (jury trial); *Gill v. Wells*, 89 U.S. 1 (1874) (jury trial on validity of reissue); *Battin v. Taggart*, 58 U.S. (17 How.) 74, 85 (1854) (jury trial); *Cochrane v. Deener*, 94 U.S. 780, 783 (1876) (equity); *Seymour v. Osborne*, 78 U.S. (11 Wall.) 516, 539 (1870) (equity); 3 William C. Robinson, *The Law of Patents*, § 1075 (1890).

That is no longer true under the current statute. Under the Patent Act of 1952, the Supreme Court has definitively ruled that "validity of a patent is a question of law." *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966) (specifically adopting the view of the concurring opinion in *Great Atlantic & Pacific Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 155, 87 USPQ 303, 307 (1950)). See also *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 280 (1976) ("The

this system, the construction of the patent claim was a matter of law exclusively for the court. *Bischoff v. Wethered*, 76 U.S. (9 Wall.) 812, 816 (1870); *Turrill v. Railroad Co.*, 68 U.S. 491, 509-511 (1863); *Winans v. New York & Erie R.R. Co.*, 62 U.S. (21 How.) 88, 100 (1859); *Silsby v. Foote*, 55 U.S. (14 How.) 218, 225 (1852); *Hogg v. Emerson*, 47 U.S. (6 How.) 437, 484 (1848).

The amendment of the patent statute by the Act of 1870,¹⁸ while a small language change, was interpreted to effect a major change from central to peripheral claiming, or at least a modified form of peripheral claiming. Claim language counted but certain equivalents of specified components of the claim might be recognized in determining infringement. In *Union Water-Meter Co. v. Desper*, 101 U.S. 332, 337 (1879), the Court explained:

Our law requires the patentee to specify particularly what he claims to be new, and if he claims a combination of certain elements or parts, we cannot declare that any one of these elements is immaterial. The patentee makes them all material by the restricted form of his claim. We can only decide whether any part omitted by an alleged infringer is supplied by some other device or instrumentality which is its equivalent.

ultimate test of patent validity is one of law."); *Lear, Inc. v. Adkins*, 395 U.S. 653, 676 (1969) (remanding so that Lear can argue invalidity "to the California courts in the first instance."); *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1566-67, 1 USPQ2d 1593, 1596 (Fed. Cir.), cert. denied, 481 U.S. 1052 (1987) ("Like all legal conclusions, that under § 103 rests on a factual evidentiary foundation.").

¹⁸ Act of July 8, 1870, Ch. 230, 16 Stat. 198, provided that the inventor "shall particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery" (emphasis added). This statute, with some amendments not pertinent here, remained in effect until 1952.

This view represented a clear departure from earlier case law. The courts were relieved by the "distinct" claiming requirement of the 1870 Act from sorting out "material" elements of an invention. Henceforth, that was done by what the inventor specified in the claims. All elements of a claim are "essential" or "material." This development coincided with the development of substantive examination of patent applications by a corps of technical examiners in the Patent Office. The claim language became the focus of examination. As held in *Keystone Bridge Co. v. Phoenix Iron Co.*, 95 U.S. 274, 278-79 (1877):

If the patentees have not claimed the whole of their invention, and the omission has been the result of inadvertence, they should have sought to correct the error by a surrender of their patent and an application for a reissue. They cannot expect the courts to wade through the history of the art, and spell out what they might have claimed, but have not claimed. . . . This duty is now cast upon the Patent Office. There his claim is, or is supposed to be, examined, scrutinized, limited, and made to conform to what he is entitled to. If the office refuses to allow him all that he asks, he has an appeal. But the courts have no right to enlarge a patent beyond the scope of its claim as allowed by the Patent Office, or the appellate tribunal to which contested applications are referred. When the terms of a claim in a patent are clear and distinct (as they always should be), the patentee, in a suit brought upon the patent, is bound by it. *Merrill v. Yeomans*, 94 U.S. 568. He can claim nothing beyond it. But the defendant may at all times, under proper pleadings, resort to prior use and the general history of the art to assail the validity of a patent or to restrain its construction. The door is then opened to the plaintiff to resort to the same kind of evidence in rebuttal; but he can

never go beyond his claim. As patents are procured *ex parte*, the public is not bound by them, but the patentees are. And the latter cannot show that their invention is broader than the terms of their claim; or, if broader, they must be held to have surrendered the surplus to the public.

See also *White v. Dunbar*, 119 U.S. 47, 50-52 (1886) (claim may not be *enlarged* by the "objective of the invention"); *James v. Campbell*, 104 U.S. 356, 370 (1881).

In addition to the requirement of distinct claims, the Act of 1870 changed the way patent cases were thereafter tried. Jury trials virtually disappeared, not to be seen again in any numbers for over a century, indeed, until the creation of this court.¹⁹ Prior to the 1870 Act, a patentee had to sue in equity for an injunction where monetary relief was in the form of an accounting for an infringer's profits. To obtain "damages" for the patentee's own losses, the patentee also had to sue at law. The 1870 Act gave equity courts in patent infringement suits the special power to award common law damages. See *Root v. Railway Co.*, 105 U.S. (15 Otto) 189, 205-207 (1881). Since most patentees wanted an injunction available only in equity, as well as the equity discovery procedure to aid in proof of infringement, the equity court became the forum of choice.

Another development which was to have a profound effect on patent jurisprudence was the creation of the Circuit Courts of Appeal in 1890. These courts became effectively the final arbiters in patent cases with the Supreme Court intervening generally only where the circuits

¹⁹ In *Blonder-Tongue Lab. v. Univ. of Illinois Found.*, 402 U.S. 313, 336 n.30 (1971), the Supreme Court noted that in the three year period spanning 1968-1970, only 13 of 382 patent cases going to trial were jury trials. In contrast, fiscal years 1992-1994 saw 163 of 274 patent trials being tried to a jury. See *Lockwood*, 50 F.3d at 980, 33 USPQ2d at 1908.

were in conflict on the validity or infringement of a particular patent. See e.g., *Sanitary Refrigerator*, 280 U.S. at 36. As is well known, conflict in patent law developed and persisted among the circuits.²⁰

When these developments occurred at the end of the 19th century, distinct claiming was in its infancy and the concept was not clearly understood. Some courts embraced peripheral claiming in its most rigid literalism. Infringement was limited to the *literal* language of the claim so that, absent claim language which brought in equivalent components, no equivalency infringement was recognized. Typical are the statements in *Fulton Co. v. Powers Regulator Co.*, 263 F. 578, 580-81 (2d Cir. 1920) (citation omitted):

[A] patent (*i.e.*, a claim) can never be given a construction broader than its terms in order to cover something which might have been claimed but was not,

and in *Goodrich v. Ford Motor Co.*, 97 F.2d 427, 430-31 (6th Cir. 1938):

The District Court invoked a literal reading of appellants' claims and held that there was no infringement. This was sound.

For a review of the few cases where infringement by equivalents was found, see Ellis, *supra* note 14 at §§ 49-61.

It is important to keep in mind that the claiming concept was being developed by equity judges. Equity courts

²⁰ See Report on S. 475, 75th Cong., 3d Sess., S.R. No. 1967 (1938), proposing a "Circuit Court for Patents":

Judgments of the various courts on these important issues, even in litigation involving the same patents, are in many instances divergent, contradictory, and irreconcilable, and cause confusion and conflict hurtful alike to owners and users of the inventions in controversy.

had full power to interpret and construe documents or even reform them in the interests of "equity." An equity judge with a bent for liberal protection for particular important inventions felt free to go behind the literal letter of the document to examine the overall equities between the parties. Lutz, pp. 470-71. In any event, during this era, the inventor was well advised to claim in a manner that *literally* encompassed equivalent components (i.e. "a spring or equivalent"; but see n.23 *infra*) because of the strict constructionist views of many judges, but he then ran the risk of "over-claiming" and loss of his patent. However, reissuance to claim more narrowly was always available.

The Supreme Court decisions after the 1870 Act continued to apply a doctrine of equivalents test for infringement but in a restrained form. The principle of *Winans* that a claim covered other forms of the invention as a matter of law *whether or not* the patentee added an express declaration to that effect was no longer followed. The Court required language in the *claim* or at least in the *specification* which indicated that the claim should be interpreted or construed to cover equivalents.

This restrictive view is articulated in *McClain v. Ort-mayer*, 141 U.S. 419, 425 (1891), where the Court states:

It is true that, in a case of doubt, where the claim is fairly susceptible of two constructions, that one will be adopted which will preserve to the patentee his actual invention; but if the language of the specification and claim shows clearly what he desired to secure as a monopoly, nothing can be held to be an infringement which does not fall within the terms the patentee has himself chosen to express his invention.

.

Applying these familiar principles to the case under consideration, we are forced to the conclusion

that the curved hook of the defendant is not an infringement of the double spring described in the plaintiff's specification and claim [even though a] single spring or hook embracing the fore wale of a collar may be equally as efficacious.

The Court treated "pioneer" inventions more generously. A typical claim during the latter part of the 19th century literally incorporated the specification into the claim and a typical question was whether the scope of protection should be *limited* to the structure disclosed in the specification. In *Sessions v. Romadka*, 145 U.S. 29, 31 (1892), the claim at issue read:

3. The spring catches, I, constructed and applied to the front of the body, as described, in combination with the tongues or hasps, J, on the top, when arranged to operate as set forth.

The letter references are to parts set out in the specification. In reversing on the issue of infringement, the Court stated:

In view of the fact that Taylor was a pioneer in the art of making a practical metallic trunk fastener, and invented a principle which has gone into almost universal use in this country, we think he is entitled to a liberal construction of his claim, and that the Romadka device, containing as it does all the elements of his combination, should be held an infringement, though there are superficial dissimilarities in their construction.

Id. at 45. Because of the pioneer nature of the invention, the Court concluded that the claim should not be limited by the letter references back to the specification. *But see LeHigh Valley R. Co. v. Kearney*, 158 U.S. 461, 469 (1895) (contra where the invention was merely an improvement).

The above cases illustrate the critical point. The scope of protection, whether liberal or narrow, was treated as

a separate question from the fact of equivalency. Under the Act of 1870, the Court continued to hold that the construction of a patent claim was an issue of law for the court alone, not the jury. *Market St. Cable Ry. Co. v. Rowley*, 155 U.S. 621, 625 (1895). The Court instructed the jury on the scope of the invention. *Coupe*, 155 U.S. at 579-80. See also *Singer Co.*, 192 U.S. at 275; *Heald v. Rice*, 104 U.S. 737, 749 (1882).

In holding that the doctrine was not restricted to pioneer inventions, the Court reiterated in *Continental Paper Bag Co. v. Eastern Paper Bag Co.*, 210 U.S. 405, 414 (1908), that the legal effect, *i.e.*, "construction" was a matter which courts determined:

The right view is expressed in *Miller v. Eagle Mfg. Co.*, 151 U.S. 186, 207, as follows: "The range of equivalents depends upon the extent and nature of the invention. If the invention is broad and primary in its character, the range of equivalents will be correspondingly broad, under the liberal construction which the courts give to such inventions."

See also *Westinghouse v. Boyden Power Brake Co.*, 170 U.S. 537, 569 (1898) (Court analyzing effect of claim language referring back to specification); *Sanitary Refrigerator*, 280 U.S. at 36 ("Both Circuit Courts of Appeal recognized that the [patent in suit] had some range of equivalents."); *Singer Co.*, 192 U.S. at 285 (Court "determined proper construction" and denied "broadening of the scope of the invention" beyond express limitations).

Under the foregoing precedent, infringement depended not only on the interpretation of the words of the claims, but also upon the court's determination that the literal words of the claim should or should not control. Thus, the court determined both the *meaning* and *scope* of the claim. My reading of the Supreme Court's decisions of the era leads me to conclude that the Court generally used the word "interpret" when it was speaking of the

meaning of the words and "construe" in connection with determining protection beyond the words, that is, the "scope" of protection for the claim, as in contract law. 3 A. Corbin, *Contracts* § 534 (1960); 4 S. Williston, *Contracts* § 602 (Jaeger ed. 1961); ALI, *Restatement (Second), Contracts* § 226, Comment c. (Tent. Draft No. 5, Mar. 31, 1970). This distinction leads to understanding some of the niceties in the Court's analyses. However, interpretation and construction are now used interchangeably, see *Markman*, 52 F.3d at 976 n.6, 34 USPQ2d at 1326 n.6, and, in any event, any difference in these words is irrelevant to the issue in this case. Both the "meaning and scope" of a patent claim were treated as issues of law for the court to decide.²¹

Because of the narrow view of many judges respecting the legal scope of protection and, thus, the need to cover variations expressly in the turn of the century era, the numbers of claims in patents proliferated to cover variations. The Patent Office sometimes fixed the number of claims arbitrarily. It also became the practice to use broad terms so as to claim as broadly as possible. The elements in the claim were frequently described as a nonspecific "means" for performing a function. Ellis, *supra* note 14 at § 16. Thus, by claiming in this or a similar manner, an accused infringer could be brought under the *literal* claim language.²²

The application of the doctrine of equivalents then took a twist. Despite the *literal* claim language expressed as a "means," (*i.e.*, any means), infringement extended only to the structure or elements disclosed in the specification

²¹ *Markman* reaffirmed that the interpretation of the words of a claim is exclusively an issue of law. If *Markman* should be reviewed by the Supreme Court, this case presents the complementary question whether determination of the scope of the claim likewise is a question of law.

²² At the time, there was no statutory provision comparable to what is now § 112, ¶ 6.

as embodiments of the invention and equivalents of such structure—not to all equivalents. See, e.g., *Continental Paper Bag*, 210 U.S. at 412-13.²³ The doctrine of equivalents was then used to determine whether

the claim should be *restricted* on the ground that a claim can validly cover only what the inventor discloses and equivalents thereof. In other words, so far as the patentee is concerned, the doctrine of equivalents is used *negatively*. It is used to narrow his claims—not to expand them.

Ellis, *supra* note 14 at § 49. In current “patentese,” this would be called the “reverse” doctrine of equivalents, use of the doctrine to restrict infringement even though covered by the literal language of a claim. Use of the doctrine to restrict broad claims became almost the exclusive use of the doctrine. *Id.*

A critical decision of the Supreme Court on claiming practice was handed down in *Halliburton Oil Well Cementing Co. v. Walker*, 329 U.S. 1 (1946). The Court declared an invention could not be claimed by a functional “means” expression at the “point of novelty.” Such language rendered the claim “indefinite” under Rev. Stat. 4888. (This ruling was overruled in the 1952 Act, now 35 U.S.C. § 112, ¶ 6 which allows *any* element of a claim to be expressed as a “means.”)

During the 1930's and 1940's, the Supreme Court spoke frequently about the criticality of claim language so as to provide the public with notice of protected rights and to encourage innovation by others. In holding claims

²³ Similarly, claims which set out specific components but modified by the language “substantially as set forth” were held “to import into the claim the particulars of the specification.” *Westinghouse*, 170 U.S. at 558. Such claims are no longer sanctioned by the PTO except for designs. Similarly, expressing an element in the claim as a specific structure “or equivalent” (e.g., a gear or equivalent) is not allowed in current practice although such language is appropriate in the specification.

invalid, the Court stated, for example, in *Permutit Co. v. Graver Corp.*, 284 U.S. 52, 60 (1931):

The statute requires the patentee . . . to inform the public during the life of the patent of the limits of the monopoly asserted, so that it may be known which features may be safely used or manufactured without a license and which may not.

And in *United Carbon Co. v. Binney & Smith Co.*, 317 U.S. 228, 236 (1942), it stated:

A zone of uncertainty which enterprise and experimentation may enter only at the risk of infringement claims would discourage invention only a little less than unequivocal foreclosure of the field.

However, the Court did not take the opportunity when presented to do away with the doctrine of equivalents, a principal cause of such uncertainty. See Martin J. Adelman and Gary L. Francione, *The Doctrine of Equivalents in Patent Law: Questions that Pennwalt Did Not Answer*, 137 U. Pa. L. Rev. 673, 682-83 (1989). In *Exhibit Supply Co. v. Ace Patents Corp.*, 315 U.S. 126 (1942), the Court merely equivocated on the doctrine's continued viability. Concluding that, in any event, estoppel precluded a finding of infringement by equivalency, the Court stated:

Whatever may be the appropriate scope and application of the doctrine of equivalents, where a claim is allowed without a restrictive amendment, it has long been settled that recourse may not be had to that doctrine to recapture claims which the patentee has surrendered by amendment.

Id. at 136.

2. Legal Limitations on Infringing Equivalents

Under each of the variants of the doctrine, the Supreme Court limited the range of permissible infringing equivalents by rules and tenets of construction which provided

a measure of certainty against unknowing infringement by equivalency.

a. *Known Equivalents*

It logically follows from the original rationale of *Winans* that a patentee *intends* to claim equivalents that an inventor could not be deemed to claim what one of skill in the art did not know at the time the patent issued. Thus, the Court limited the range of infringing substitutions to those in which components were substituted which were *known* to be equivalents. Where the invention was an improvement on a known process or machine, the substitution had to be known *in that art* as an equivalent at the time the patent issued. *Seymour v. Osbourne*, 78 U.S. (11 Wall.) 516, 556 (1870). In *Gill v. Wells*, 89 U.S. (22 Wall.) 1, 28-30 (1874), the Court used the phrase "legal equivalent within the meaning of the Patent law" to identify this restriction on infringing equivalents. Equivalency-in-fact was not enough. The Court explained:

Questions of the kind usually arise in comparing the machine of the defendant in a suit for infringement with that of the plaintiff, and the rule is that if the defendant omits entirely one of the ingredients of the plaintiff's combination, without substituting any other, he does not infringe, and if he substitutes another in the place of the one omitted, which is new or which performs a substantially different function, or even if it is old *but was not known* at the date of the plaintiff's patent as a proper substitute for the omitted ingredient, he does not infringe.* By an equivalent in such a case it is meant that the ingredient substituted for the one withdrawn performs the same function as the other, and that it *was well known at the date of the patent* securing the invention as a proper substitute for the one omitted in the patented combination.†

....

[I]t is clear law that the substituted ingredient *cannot be regarded as a legal equivalent*, within the meaning of the Patent law, unless it performs substantially the same function as the ingredient withdrawn, *and was well known* as such an ingredient *at the date of the original patent and as a proper substitute* for the ingredient which was included in the patented combination.

* *Carver v. Hyde*, 16 Peters, 514; *Brooks v. Fiske*, 15 Howard, 212; *Stimpson v. Railroad*, 10 Id. 329; *Prouty v. Ruggles*, 16 Peters, 341.

† *Gould v. Rees*, 15 Wallace, 194.

Gill, 89 U.S. at 28, 30 (emphasis added).

The case of *Gould v. Rees*, 82 U.S. (15 Wall.) 187 (1872), cited in *Gill*, is particularly instructive on the legal insufficiency of an equivalency-in-fact test to determine infringement. The Court held that the instructions to the jury were legally erroneous in failing to preclude certain equivalents from the ambit of infringement. *Id.* at 194-95. On a challenge to the instructions, the Court stated:

Unexplained, the theory assumed by the court warranted the jury in finding for the plaintiff, though the defendant in constructing his machine omitted one of the ingredients of the plaintiff's combination and substituted another in its place to perform the same function, whether the ingredient substituted for *the one omitted was or was not newly discovered, or was or was not well known at the date of the plaintiff's patent* as a proper substitute for the one omitted from the combination constituting the plaintiff's invention.

....

Tested by these principles, as the instruction in question must be, it is plainly erroneous, as it warranted the jury in finding for the plaintiff, whether

the ingredient substituted for the one omitted was new or old, or whether the one substituted was or was not well known at the date of the plaintiff's patent as a proper substitute for the omitted ingredient.

Id. at 193-95 (emphasis added).

As indicated, the Court mandated a broader range of infringing equivalents for what it termed "primary" or "pioneer" inventions or for an invention having particular merit.²⁴ *Continental Paper Bag*, 210 U.S. at 415; *Miller v. Eagle Mfg. Co.*, 151 U.S. 186, 207 (1894); *Morley Sewing Machine Co. v. Lancaster*, 129 U.S. 263, 273 (1889); *McCormick v. Talcott*, 61 U.S. (20 How.) 402, 405 (1857); *Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 U.S. 45, 63 (1923). However, even in the context of a pioneer patent, the Court applied a "known equivalents" rule, albeit appropriately modified to eliminate the requirement of being known in that previously unknown art at the time the patent issued. As explained in *Morley Sewing Machine*:

It may be true that the defendant's peculiar form of stitch was unknown before; and it may also be true that his arrangement for carrying the buttons with their eyes upward, and turning the eyes into a horizontal plane by the twisting of the conveyer-way,

²⁴ The term "pioneer" was defined in *Westinghouse*, 170 U.S. at 561-62:

This word, although used somewhat loosely, is commonly understood to denote a patent covering a function never before performed, a wholly novel device, or one of such novelty and importance as to mark a distinct step in the progress of the art, as distinguished from a mere improvement or perfection of what had gone before. Most conspicuous examples of such patents are the one to Howe of the sewing machine; to Morse of the electrical telegraph; and to Bell of the telephone.

See also *MAC Corp. v. Williams Patent Crusher & Pulverizer Co.*, 767 F.2d 882, 884 n.3, 226 USPQ 515, 517 n.3 (Fed. Cir. 1985).

was not before known. Of course, they were not before known in a machine for automatically sewing buttons to a fabric, because Morley's machine was the first to do that. But still, the defendant employs for the above purposes known devices, which, in mechanics, were recognized as proper substitutes for the devices used by Morley to effect the same results.

.....

In this sense, the mechanical devices used by the defendant are known substitutes or equivalents for those employed in the Morley machine to effect the same result; and this is the proper meaning of the term "known equivalent," in reference to a pioneer machine such as that of Morley. Otherwise, a difference in the particular devices used to accomplish a particular result in such a machine would always enable a defendant to escape the charge of infringement, provided such devices were new with the defendant in such a machine, because, as no machine for accomplishing the result existed before that of the plaintiff, the particular device alleged to avoid infringement could not have existed or been known in such a machine prior to the plaintiff's invention.

129 U.S. at 289-90.

The tenet that the substitution had to be a known equivalent at the issue date was consistently applied prior to *Graver* and was explicitly reiterated in 1946 by the Supreme Court in *Halliburton Oil Well Cementing*, 329 U.S. at 13, shortly before *Graver II*, where the Court explained:

[T]he alleged infringer could have prevailed if the substituted device (1) performed a substantially different function; (2) *was not known* at the date of Walker's patent as a proper substitute for the resonator; or (3) had been actually invented after the date of the patent. [Emphasis added.]

Thus, the law preceding *Graver II* was that equivalency had to be known at the date of the patent.²⁵

b. Prosecution History Estoppel

A construction of the claim to cover equivalents is precluded to the extent of the actions taken and the statements made by the patentee to the Patent Office in securing the patent grant. A patentee is not entitled, after patent issuance, to have protection from a claim extend to devices or processes or elements therein which during prosecution the inventor treated as a different invention from the one for which the inventor sought and obtained protection. Even where the scope could extend to equivalents, infringement is barred by reason of the patentee's manifest intent.

The precedent is voluminous in which the Court applied estoppel based on prosecution as a matter of law. See *Sutter v. Robinson*, 119 U.S. 530, 541 (1886) ("[Patentee] is not at liberty now to insist upon a construction of his patent [i.e., legal effect] which will include what he was expressly required to abandon and disavow as a condition of the grant."); *Keystone Driller Co. v. Northwest Eng'g Corp.*, 294 U.S. 42, 48 (1935) (Principle applied "that where such broad claims are denied and a

²⁵ *Nat'l Cash Reg. Co. v. Boston Cash Indicator and Rec. Co.*, 156 U.S. 502, 516-17 (1895); *Hoyt v. Horne*, 145 U.S. 302, 309 (1892); *Morley Sewing Machine*, 129 U.S. at 289-90; *Electric RR Signal Co. v. Hall Railway Signal Co.*, 114 U.S. 87, 96 (1885); *Rowell v. Lindsay*, 113 U.S. 97, 102 (1885); *Clough v. Gilbert & Barker Mfg. Co.*, 106 U.S. 166, 178 (1882); *Wicke v. Ostrum*, 103 U.S. 461, 469 (1880); *Goodyear Dental Vulcanite v. Davis*, 102 U.S. 222, 227 (1880); *Imhaeuser v. Buerk*, 101 U.S. 647, 656 (1879); *Fuller v. Yentzer*, 94 U.S. 288, 297 (1876); *Fuller v. Yentzer*; *Same v. Goodrich*, 94 U.S. 299, 300 (1876); *Gill*, 89 U.S. at 30; *Mitchell v. Tilghman*, 86 U.S. (19 Wall.) 287, 418 (1873); *Gould*, 82 U.S. at 194; *Seymour v. Osbourne*, 78 U.S. (11 Wall.) 488, 556 (1870); *McCormick*, 61 U.S. at 405; *O'Reilly*, 56 U.S. at 123; *Carver v. Hyde*, 41 U.S. (16 Pet.) 513, 519 (1842); *Prouty*, 41 U.S. at 341.

narrower substituted, the patentee is estopped to read the granted claim as the equivalent of those which were rejected." (footnote omitted)); *Smith v. Magic City Kennel Club*, 282 U.S. 784, 790 (1931) ("[W]here a patentee has narrowed his claim in order to escape rejection, he may not 'by resort to the doctrine of equivalents, give to the claim the larger scope which it might have had without the amendments which amount to a disclaimer.'") (citing *Weber Electric Co. v. E. H. Freeman Electric Co.*, 256 U.S. 668, 677 (1921)); and *I.T.S. Rubber Co. v. Essex Rubber Co.*, 272 U.S. 429, 444 (1926) (same).

c. Prior Art Limitations

Somewhat related to the rationale of prosecution history estoppel, which applies to an element, is the tenet that a claim to a product or process cannot be construed so as to encompass the same or substantially the same overall product or process in the prior art. *Keystone Driller*, 294 U.S. at 46-47 ("We hold, in view of the prior art and of the file wrapper, the petitioner is not entitled to a broad reading of the claim."); *Computing Scale Co. v. Automatic Scale Co.*, 204 U.S. 609, 617 (1907) ("[I]t is well settled that the claim as allowed must be read and interpreted with reference to the rejected claim, and to the prior state of the art, and cannot be so construed as to cover either what was rejected by the Patent Office or disclosed by prior devices." (quoting *Hubbell v. United States*, 179 U.S. 77, 80 (1900))); *Knapp v. Morss*, 150 U.S. 221, 224-25 (1893) (same). *Accord Wilson Sporting Goods Co. v. David Geoffrey & Assoc.*, 904 F.2d 677, 684, 14 USPQ2d 1942, 1948 (Fed. Cir.), cert. denied, 498 U.S. 992 (1990).

d. No Enlargement of the Claim

Because of the importance of claim limitations in modern patent practice, litigants frequently argue today that infringement by equivalents *ipso facto* "enlarges" the

claim to cover unclaimed subject matter. In a sense, that is true. When infringement is found under the doctrine, the claim protects something not literally specified in the claim. But a distinction can be drawn that is not too esoteric between substitution of an equivalent for a component *in* an invention and enlarging the metes and bounds of the invention *beyond* what is claimed. And it is a distinction that the Supreme Court has consistently drawn. Enlargement of the metes and bounds of the claim requires reexamination by the office charged with that function, now the Patent and Trademark Office. In contrast, assuming the PTO had done its job, as we must, known equivalents of a claim element were considered in determining patentability of an issued claim.²⁸

Hilton Davis argues that the Warner-Jenkinson *process* is an "equivalent" of the claimed *process*. In rejecting the patentee's similar assertion of *overall* equivalency as the test for infringement, the Supreme Court held in *Burr v. Duryee*, 68 U.S. (1 Wall.) 531, 573 (1863):

The argument used to show infringement assumes that every combination of devices in a machine which is used to produce the same effect, is necessarily an equivalent for any other combination used for the same purpose. This is a flagrant abuse of the term "equivalent."

Where a claim to an invention is expressed as a combination of elements, as here, "equivalents" in the sobriquet "Doctrine of Equivalents" refers to the equivalency of an *element* or *part* of the invention with one that is substituted in the accused product or process. The theory of infringement under the doctrine is that substitution of an equivalent for a part of a claimed combina-

²⁸ Consideration of equivalents to elements of a claim has been part of examination of applications for patentability over *prior art* under all statutes. This concept is now embodied in examination under section 103. 35 U.S.C. § 103.

tion means that the accused process or product is substantially the *same* as the claimed invention. *Graver II*, 339 U.S. at 608; *Sanitary Refrigerator*, 280 U.S. at 41-42; *Union Paper Bag Machine Co. v. Murphy*, 97 U.S. 120, 125 (1877). An infringing product or process may also be referred to as an "equivalent" of the invention, but more than overall equivalency is required. While a ballpoint and fountain pen may be equivalent overall, they are not equivalent in the sense of the doctrine because their components are not equivalent. As further explained in *Burr*, 68 U.S. at 572:

Now, the machine of Boyden has not one of the peculiar devices, or combination of devices, of the Wells machine, nor *any substantial identity* with it, unless by substantial identity is meant every machine which produces the same effect. These abstract phrases, "*substantial identity*," "*equivalent*," "*mode of operation*," &c., are often used in such a vague and equivocal manner, that they mystify and lead many to absurd conclusions, who will not distinguish between things that differ. That two machines produce the same effect, will not justify the assertion that they are substantially the same, or that the devices used by one are, therefore, mere equivalents for those of the other. [Emphasis added.]

This view that the accused device or process must be more than "equivalent" *overall* reconciles the Supreme Court's position on infringement by equivalents with its concurrent statements that "the courts have no right to enlarge a patent beyond the scope of its claims as allowed by the Patent Office." *Minerals Separation*, 250 U.S. at 347 (quoting *Keystone Bridge*, 95 U.S. at 278). The "scope" is not enlarged if courts do not go beyond the substitution of equivalent elements.

In *Minerals Separation*, the claims in issue specified the use of "a fraction of one percent of oil" in a process to

improve the concentration of ore. The Court rejected the argument that the claims were indefinite because a precise fraction was not specified. *Id.* at 338. But, by the same token, the express limitation to less than one percent fixed the scope of protection. Thus, the defendant's use of oil in excess of one percent did not constitute infringement. *Id.* at 354.

The prohibition against enlargement of a claim had been explicated earlier in the cited case *Keystone Bridge*, 95 U.S. at 278-79, as follows:

When a claim is so explicit, the courts cannot alter or enlarge it. If the patentees have not claimed the whole of their invention, and the omission has been the result of inadvertence, they should have sought to correct the error by a surrender of their patent and an application for a reissue [T]he courts have no right to enlarge a patent beyond the scope of its claim as allowed by the Patent Office, or the appellate tribunal to which contested applications are referred. When the terms of a claim in a patent are clear and distinct (as they always should be), the patentee, in a suit brought upon a patent, is bound by it. . . . As patents are procured *ex parte*, the public is not bound by them, but the patentees are. And the latter cannot show that their invention is broader than the terms of their claims; or, if broader, they must be held to have surrendered the surplus to the public.

If the patentee is entitled to a patent for [a] product [or process] . . . and has failed . . . to obtain it, the law affords him a remedy, by a surrender and reissue. When this is done, the world will have fair notice of what he claims, of what his patent covers, and must govern themselves accordingly [N]othing can be more just and fair, both to the patentee and to the public, than that the former

should understand, and correctly describe, just what he has invented, and for what he claims a patent.

Similarly, the Court has repeatedly held that the complete elimination of an element in a claimed combination creates a *different* invention. *Vance v. Campbell*, 66 U.S. (1 Black) 427, 429-30 (1861); *Schumacher v. Cornell*, 96 U.S. 549, 554 (1877); *accord Pennwalt v. Durand-Wayland, Inc.*, 833 F.2d 931, 4 USPQ2d 1737 (Fed. Cir. 1987) (*in banc*), *cert. denied*, 485 U.S. 1009 (1988). Equivalency encompasses merely *substitutions* in the patented combination. As held by the Court in *Union Water-Meter*, 101 U.S. at 337:

It may be observed, before concluding this opinion, that the courts of this country cannot always indulge the same latitude which is exercised by English judges in determining what parts of a machine are or are not material. Our law requires the patentee to specify particularly what he claims to be new, and if he claims a combination of certain elements or parts, we cannot declare that any one of these elements is immaterial. The patentee makes them all material by the restricted form of his claim. We can only decide whether any part omitted by an alleged infringer is supplied by some other device or instrumentality which is its equivalent.

See also Yale Lock Mfg. Co. v. Sargent, 117 U.S. 373, 378 (1866) ("The defendant does not use the same combination, and employs no device as an equivalent and substitute for the omitted element.", citing *Union Water-Meter* and *Gage v. Herring*, 107 U.S. 640 (1883)). In the Court's view, where an equivalent is substituted for an element, the combination may remain essentially the same invention, not one broader than that of the claim, *i.e.*, a species claim remains a species claim. Conversely, to enforce the claim against a combination lacking even one element or its equivalent would extend coverage to a

different invention because the claim is thereby broadened. The accused infringement is, *ipso facto*, not substantially the same as the patented invention without at least an equivalent substituent for each element of a claim. Infringement requires, *inter alia*, that every limitation of a claim be satisfied exactly or by an equivalent. *Pennwalt*, 833 F.2d at 935, 4 USPQ2d at 1739-40; *Read Corp.*, 970 F.2d at 822, 23 USPQ2d at 1431. See *Cimiotti Unhairing Co. v. American Fur Refining Co.*, 198 U.S. 399, 410 (1905), and cases cited therein.

It would unnecessarily lengthen this already lengthy opinion to review all of the permutations of the doctrine as applied to inventions of various types and character preceding the *Graver II* decision.²⁷ Suffice here as a general summary that a finding of infringement under the doctrine required the court to determine the meaning and scope of the claim, based on the inventor manifesting an intent to cover equivalents in the claims or specification; the components of the accused product or process had to be equivalent in fact and finally, as a matter of law, the claim could cover only such equivalent substituents in the accused product or process that did not violate the foregoing tenets.

3. *Graver II*

The majority states that "the Supreme Court mapped the modern contours of the doctrine of equivalents in its landmark *Graver Tank* decision," slip op. at 5, and concludes that infringement may be found under that prece-

²⁷ The doctrine also encompassed changes other than substitution of an equivalent for a claim element, such as rearranging steps of a method, combining two parts into one, separating one element into two, and changes in shape. *Sanitary Refrigerator* involved reciprocal changes "in form and position"; the position of a lug was changed which required shortening the arm of a latch. 280 U.S. at 42.

dent. Clearly not. The majority has taken an errant detour off the map drawn in the *Graver II* decision.

The importance of *Graver II* lies in the Court's affirmation that the doctrine "continues today ready and available for utilization when the proper circumstances for its application arise." *Graver II*, 339 U.S. at 608. In the *Graver* decisions, the Supreme Court reviewed a case raising issues of the validity and infringement of a patent owned by Linde Air Products Company for an electric welding process and for fluxes to be used therewith. The district court had held certain flux claims and all process claims invalid. Those claims merely required silicates or metallic silicates as the principal constituent of the flux. While nine operative silicates (including manganese) were listed in the specification,²⁸ the claims were so broad as to include inoperative embodiments and processes. *Linde Air Prods. Co. v. Graver Tank & Mfg. Co.*, 86 F. Supp. 191, 198, 75 USPQ 231, 237-38 (N.D. Ind. 1947). However, the district court upheld four narrower flux claims and found infringement by application of the doctrine of equivalents. *Id.* at 199, 75 USPQ at 238. These valid flux claims (claims 18, 20, 22, and 23) specified a combination of ingredients, a major constituent being an alkaline earth metal silicate, such as magnesium silicate. The infringer used a nonalkaline earth metal, namely manganese, in the flux in place of magnesium. The district court first found that the two compositions were identical in operation, in the kind of weld produced, and for all practical purposes manganese silicate could be substituted in the claimed composition. The court then stated:

²⁸ At the time of filing the Linde application, the Patent Office restricted an applicant to three species claim. See L. Chasan, *Graver v. Linde—A Valid Patent*, J. Pat. Off. Soc'y, Vol. XXXII, No. 4, p. 285, 295-96 (April 1950) (PTO limited species claims to three in one application whereas the inventor in *Graver* had disclosed nine in its specification).

Whether it actually infringes these claims depends upon what application is made of the doctrine of equivalents.

Id. at 199, 75 USPQ at 238. To answer that question, the court considered the entirety of the patent and its prosecution. Looking to the specification, the court concluded that manganese was taught as a substituent in the invention and noted that the inventors specifically stated that other suitable materials including manganese could form the main body of the flux. Thus, applying the doctrine, the court entered judgment of infringement.

The Court of Appeals affirmed validity and infringement of the narrow claims, 167 F.2d 531, 538-39, 77 USPQ 207, 213 (7th Cir. 1948), *cert. granted*, 335 U.S. 810 (1948), but reversed the judgment of invalidity of the broad claims, holding that they were valid as to the nine listed operative embodiments. *Id.* at 538, 77 USPQ at 212. In the first Supreme Court decision, *Graver Tank Mfg Co. v. Linde Air Prods. Co.*, 336 U.S. 271 (1949) (*Graver I*), the Court unanimously upheld the validity and infringement of the narrow claims, two justices separately concurring on the issues of validity.²⁹ The Court principally focused on the validity of the broad flux claims and held that the Court of Appeals erred in upholding their validity by restricting them to the nine operative embodiments in the specification, instead of evaluating the invention as claimed. *Graver I*, 336 U.S. at 277.

The second *Graver* decision, 339 U.S. 605, (*Graver II*), followed the grant of a petition for rehearing (337

²⁹ The concurring opinion disagreed with the majority's standard of review of validity as a finding of fact. In their view, "whether the thing patented amounts to a patentable invention is a question of law to be decided by the courts as such." *Graver I*, 336 U.S. at 280. That view prevailed ultimately in *Graham v. John Deere*, 383 U.S. 1 (1966).

U.S. 910) limited to the question of infringement of the four valid flux claims under the doctrine. Specifically, the Court stated that on rehearing the issue was limited to "the applicability of the doctrine of equivalents to the findings of fact in this case." *Id.* at 910-11. *See also Graver II*, 339 U.S. at 606. The infringer urged that the doctrine conflicted with the statutory requirement for distinct claims and should be *eliminated* as a basis for infringement. *See* Arthur H. Swanson, *A Discussion of the Application of the Doctrine of Equivalents in the Graver v. Linde Case*, 33 J. Pat. Off. Soc'y 19, 32 (Jan. 1951).

The *Graver II* analysis of infringement began by restating the general purposes behind recognition of infringement by an imitation which does not copy every literal detail of a patented invention. To accept literalism would encourage the unscrupulous copyist. "[U]nimportant and insubstantial changes and substitutions in the patent" should not escape the reach of the law. *Graver II*, 339 U.S. at 607. The Court denounced minor variations made to "conceal and shelter the piracy," and saw unfairness in placing an inventor "at the mercy of verbalism." *Id.* The Court explained that the essence of the doctrine of equivalents, which had been applied since *Winans* (56 U.S. (15 How.) 330) and ever since, is that one may not practice a "fraud on a patent." *Graver II*, 339 U.S. at 608.

On the issue raised by the petition, the Court was unpersuaded to write an obituary for the doctrine. The Court reaffirmed its viability, stating that it continued "ready and available for utilization when the proper circumstances for its application arise." *Graver II*, 339 U.S. at 608. It stated that a patentee may invoke this doctrine against a producer of a device that performs substantially the same function in substantially the same way to obtain the same result as the patented invention, quoting the tripartite test of *Sanitary Refrigerator*, 280 U.S. 30. *Graver II*, 339 U.S. at 608.

The Court reaffirmed its precedent that both pioneer and secondary inventions were entitled to protection under the doctrine, although the area of equivalence may vary under the circumstances. It discussed the "reverse" doctrine of equivalents, citing *Westinghouse*, 170 U.S. 537, 568, a case with claims drafted referring back to the specification.³⁰ It approved the application of the doctrine to chemical compositions "where there was equivalence between chemical ingredients" *Graver II*, 339 U.S. at 609. With respect to determining equivalency of ingredients, it stated (emphasis added):

What constitutes equivalency must be determined against the context of the patent, the prior art, and the particular circumstances of this case. Equivalence, in the patent law, is not the prisoner of a formula Consideration must be given to the purpose for which an ingredient is used in a patent, the qualities it has when combined with the other ingredients, and the function which it is intended to perform. An important factor is whether persons reasonably skilled in the art would have known of the interchangeability of an ingredient not contained in the patent with one that was.

A finding of equivalence is a determination of fact. *Id.* As will be explained, I have added the emphasis to show how I believe the passage should be read.

Turning to the facts in *Graver*, the Court noted that the accused and patented products were "alike" in all respects except for the substitution of manganese for magnesium and stated:

The question which thus emerges is whether the substitution of the manganese which is not an alkaline

³⁰ Because of current claiming practice, the reverse doctrine is now rarely invoked and even more rarely applied except under § 112, ¶ 6.

earth metal for the magnesium which is, under the circumstances of this case, and in view of the technology and the prior art, is a change of such substance as to make the doctrine of equivalents inapplicable; or conversely, whether under the circumstances the change was so insubstantial that the trial court's invocation of the doctrine of equivalents was justified.

Id. at 610.

The Court noted the evidence of record and the findings of the trial judge therefrom that the accused "Lincolnweld" flux and the patented composition were substantially identical, that they were equivalent for welding purposes, and that "for all practical purposes, manganese silicate can be efficiently and effectually substituted for calcium and magnesium silicates as the major constituent of the welding composition." These findings were held not clearly erroneous. *Id.* at 611-12.

With respect to whether invocation of the doctrine was justified under the circumstances, the Court stated:

It is difficult to conceive of a case more appropriate for application of the doctrine of equivalents. The disclosures of the prior art made clear that manganese silicate was a useful ingredient in welding compositions. Specialists familiar with the problems of welding compositions understood that manganese was equivalent to and could be substituted for magnesium in the composition of the patented flux and their observations were confirmed by the literature of chemistry. Without some explanation or indication that Lincolnweld was developed by independent research, the trial court could properly infer that the accused flux is the result of imitation rather than experimentation or invention. Though infringement was not literal, the changes which avoid literal infringement are colorable only. We conclude that the trial court's judgment of infringement respecting the four

flux claims was proper, and we adhere to our prior decision on this aspect of the case.

Id. at 612.

Once the Court decided to reendorse the doctrine, the *Graver* facts presented a routine case for affirming infringement. The infringer made a substitution for one ingredient in an improved patented flux composition. There was no "enlargement." The substituted ingredient was known by those skilled in the art to be equivalent to the ingredient of the claim, having been used in prior art fluxes. The scope of the claim could include equivalents because of the extension to equivalents in the description in the specification and the broad (invalid) claims of the patent. Under such circumstances, the substitution of manganese for magnesium was only a "colorable" change.

It must be noted that the Court did not speak in *Graver II* of the need for notice to the public by the claim. However, the facts of *Graver* were unique: the manganese flux was a protected embodiment of the invention when the infringer began its use. It was disclosed in the specification as an example of the broad claims of the patent, as issued, to a flux containing metallic silicates. *Graver I*, 336 U.S. at 276. Only after *Graver I* were these claims finally invalidated. *Id.* at 276-79. Thus, the maxim that disclosed but *unclaimed* subject matter is deemed to be dedicated to the public³¹ did not apply. While the inventor's attempt to claim his invention broadly failed, it was clear from the patent itself that the inventor did not intend to dedicate the disclosed manganese embodiment of his invention to the public. Clearly, the normal tension between the doctrine and notice to the public of the scope of an invention did not exist. The *Graver* infringer was on notice from the patent itself that it was taking an embodiment of the invention. A narrower application of the doctrine is hardly conceivable.

³¹ *Sontag Chain Stores*, 310 U.S. at 293.

The majority seizes on the sentence "A finding of equivalence is a determination of fact," *Graver II*, 339 U.S. at 609, as a declaration by the *Graver II* Court that the determination of infringement under the doctrine is entirely a fact question and, therefore, for the jury. This would be a remarkable change from what the law had been. I read the statement in context to say "What constitutes equivalency . . . of an ingredient not contained in the patent with one that was . . . is a determination of fact." It would be helpful to the position I advocate if the Court had expressly declared that the meaning and scope of a claim remain questions of law for the court. However, applying the doctrine of equivalents to the Court's language, I equate "the application of the doctrine of equivalents," the words the Court used, with determining the proper scope of the claim.

The *Graver* Court overturned none of its precedent that the meaning and scope of a claim are issues of law. To the contrary, the Court relied on *Winans*, *Sanitary Refrigerator*, *Union Paper Bag Machine Co.*, *Gould*, and *Westinghouse*, *id.* at 608-09, all of which reflect that principle. The legal effect of a claim. *i.e.*, its scope, is a matter for the court to decide as an issue of law, not fact.

4. *The Patent Act of 1952*

The major revision of the patent statute in 1952 says nothing about infringement based on equivalency overall or to elements of a claim except in section 112, ¶ 6. It was argued, after enactment of the 1952 Act, post-*Graver II*, that the judicial doctrine of "equivalents" conflicted with the 1952 Act and should be eliminated. See *Noll v. O.M. Scott Co.*, 467 F.2d 295, 299 n.2, 175 USPQ 392, 396 n.2 (6th Cir. 1972), *cert. denied*, 411 U.S. 965 (1973); 1970 Am. Pat. L. Ass'n Bull. 27-29. However, the appellate courts continued to apply *Graver Tank* both affirmatively and negatively under varying formulations of the standard. See *Mead Digital Sys., Inc. v. A.B. Dick*

Co., 723 F.2d 455, 221 USPQ 1035 (6th Cir. 1983); *CMI Corp. v. Barber-Greene Co.*, 683 F.2d 1061, 217 USPQ 456 (7th Cir. 1982) (issue taken from jury); *Sarkisian v. Winn-Proof Corp.*, 686 F.2d 671 213 USPQ 912 (9th Cir. 1981), *on reh'g*, 688 F.2d 647 (9th Cir. 1982) (*in banc*), *on remand*, 697 F.2d 1313, 217 USPQ 702, *cert. denied sub nom. Carsonite Int'l Corp. v. Carson Mfg. Co.*, 460 U.S. 1052 (1983); *Sealed Air Corp. v. United States Int'l Trade Comm'n*, 645 F.2d 976, 209 USPQ 469 (CCPA 1981); *Weidman Metal Masters Co. v. Glass Master Corp.*, 623 F.2d 1024, 207 USPQ 101 (5th Cir. 1980), *cert. denied*, 450 U.S. 982 (1981); *Ziegler v. Phillips Petroleum Co.*, 483 F.2d 858, 177 USPQ 481 (5th Cir.), *cert. denied* 414 U.S. 1079 (1973); *Graphicana Corp. v. Baia Corp.*, 472 F.2d 1202, 176 USPQ 455 (6th Cir. 1973); *Nelson v. Batson*, 322 F.2d 132, 138 USPQ 552 (9th Cir. 1963); *Entron, Inc. v. Jerrold Elecs. Corp.*, 295 F.2d 670, 131 USPQ 209 (4th Cir. 1961);

The Supreme Court itself has not spoken on the doctrine after enactment of the current statute. It has, however, used similar language in construing claims for validity purposes by reference to the specification, prior art, and the prosecution history. *Graham v. John Deere*, 383 U.S. 1, 33-34 (1966) (claims carefully drafted; not free to assert broader view of invention);³² *Adams v. United States*, 383 U.S. 39, 48-51 (1966) (no equivalent of invention in prior art).

Our precedent has also drawn a fact/law distinction, albeit not clearly, between the tripartite test and at least some restrictions on the scope of infringing equivalents. As stated in *Thomas & Betts Corp. v. Litton Sys. Inc.*, 720 F.2d 1572, 1579, 220 USPQ 1, 6 (Fed. Cir. 1983), we held:

³² See Roy H. Wepner, *The Patent Invalidity/Infringement Parallel: Symmetry or Semantics?*, 93 Dickinson L. Rev. 67 (1988).

A finding of equivalency, namely, that a device performs substantially the same function in substantially the same way to obtain the same result, is a determination of fact.

Conversely, we have declared *de novo* review is required for the legal questions of: (1) the meaning of the claim (*Markman*, 52 F.3d at 970-71, 34 USPQ2d at 1322; *Read Corp.*, 970 F.2d at 821, 23 USPQ2d at 1431); (2) whether an asserted range of equivalents would cover what is already in the public domain (*Wilson Sporting Goods*, 904 F.2d at 683, 14 USPQ2d at 1948); and (3) prosecution history estoppel (*Texas Instruments, Inc. v. United States Int'l Trade Comm'n*, 988 F.2d 1165, 1173, 26 USPQ2d 1018, 1024 (Fed. Cir. 1993)). Properly understood, as previously explained, these questions are merely subparts under the larger question of the scope of protection to which the claim is entitled. *Accord Ziegler*, 483 F.2d at 867, 177 USPQ at 487. We have, however, never articulated that under the doctrine the scope of equivalents is a separate legal question.

In sum, I conclude that a finding of infringement under the doctrine is a mixed question of law and fact. In a jury case, proper instructions must identify factual issues and legal limitations on finding equivalency. On the other hand, the meaning and scope of a claim are issues of law for the trial judge to decide. In ruling on the issue, I would require the trial judge to explain the basis for its conclusion that a competitor would have notice that the claim covers equivalent elements of the claimed product or process.

As will become evident, the trial judge in this case sent the case to the jury without any restrictions on what was a legal equivalent beyond the tripartite test and their "finding" of no estoppel (an issue of law). Further, the court legally erred in holding, post-verdict, that "the doctrine of equivalents applies" under the circumstances of this case.

D. Merits

1. The Patent Claims in Suit are Wrongfully Enlarged to Find Infringement

As indicated, the claimed invention consists of a combination of steps in a process for ultrafiltration of certain dyes. Specifically, claim 1 requires, *inter alia*, three steps which are at issue here:

1. Ultrafiltration through a membrane having a nominal pore diameter of 5-15 Angstroms;
2. under a hydrostatic pressure of approximately 200 to 400 p.s.i.g.;
3. at a pH from approximately 6.0 to 9.0.

The accused process of Warner-Jenkinson operates at a hydrostatic pressure of 500 p.s.i.g.³³ and at a pH of 5.0. Hilton Davis concedes that Warner-Jenkinson's process does not literally satisfy either of those claim elements (elements 2 and 3). Infringement is asserted solely under the doctrine of equivalents.³⁴ The court entered judg-

³³ The majority states that the Warner-Jenkinson process operates at a pressure of 200 to 500 p.s.i.g. However, at the correct measuring point, the upstream side of the membrane, the pressure was 500 p.s.i.g. That the pressure reduces thereafter is irrelevant.

³⁴ There was no evidence of the pore size of the membranes in the ultrafiltration equipment used by Warner-Jenkinson. Warner-Jenkinson does not know the pore size of the membrane in its equipment and neither does Hilton Davis. Hilton Davis did not call the membrane supplier as a witness. The evidence is simply testimony that Warner-Jenkinson's pore size must be equivalent because the accused process works. In *Malta v. Schulmerich Carillons Inc.*, 952 F.2d 1320, 21 USPQ 1161 (Fed. Cir. 1991), *cert. denied*, 504 U.S. 974 (1992), this court concluded that "conclusory statements" are "not sufficiently particularized evidence" to prove infringement under the doctrine of equivalents. Such evidence is clearly nonprobative that Warner-Jenkinson uses a membrane having the required pore size. Concluding Warner-Jenkinson's membrane had the claimed pore diameter is nothing short of mere

ment upon the jury returning its verdict of infringement and issued an injunction enjoining Warner-Jenkinson from manufacturing or selling FD&C Red # 40 and FD&C Yellow # 6 dyes made at a pH less than 9.01 and at pressures at the input to the first membrane of less than 500 psig. Thus, the following comparison is appropriate:

Claimed Process	Warner-Jenkinson Injunction Process	Against Use of
Approx. 200-400 psig pH from approx. 6.0-9.0	500 psig pH 5.0	500 psig or less any pH under 9.01

The majority nowhere recognizes the Supreme Court's binding precedent prohibiting enlargement of the scope of a claim, which is dispositive of this appeal without further analysis.³⁵ The claims are clear and specific. Nothing in the specification indicates that the invention extends beyond the specific ranges. There is no dispute that the Warner-Jenkinson process does not meet all limitations of the claims. Under such circumstances, where there are no material issues of fact,

the question of infringement resolves itself in each case into one of law, depending upon a comparison between the structure disclosed on the face of the patent and the [accused device], and the correct application thereto of the rule of equivalency. *Compare Singer Company v. Cramer*, 192 U.S. 265, 275.

Sanitary Refrigerator, 280 U.S. at 36. Further, the most recent decision of the Supreme Court on point, *Singer*

speculation. See *Morton Int'l, Inc. v. Cardinal Chemical Co.*, 959 F.2d 948, 22 USPQ2d 1231 (Fed. Cir. 1992) (no infringement based on mere speculation as to the existence of a claimed compound).

³⁵ The scope of enlargement of the pH value is staggering inasmuch as a change of one numerical value represents a relative change in the acidity equal to a factor of 10. A change of two numerical values represents a relative change in the acidity equal to a factor of 100 (i.e. the pH scale is logarithmic).

Co., 192 U.S. 265, held that under such circumstances the trial court erred in not directing a verdict for the defendant on a proper application of the doctrine of equivalents. As stated therein with emphasis added:

[I]t is unnecessary to consider and decide any other assignment [of error] than that based upon the exception to the refusal of the court, at the close of all the evidence, to instruct a verdict for the defendant on the ground that "no infringement whatever had been shown." As in each of the patents in question it is apparent from the face of the instrument that extrinsic evidence is not needed to explain terms of art therein, or to apply the descriptions to the subject matter, and as we are able from mere comparison to comprehend what are the inventions described in each patent and from such comparison to determine whether or not the Diehl device is an infringement upon that of Cramer, *the question of infringement or no infringement is one of law and susceptible of determination on this writ of error.*

Id. at 275.

The Supreme Court then itself considered the structure of the accused device and, contrary to the majority opinion today, treated the issue of the "substantiality" of the change from the patented invention as a question for the court, not the jury:

Having determined the proper construction of the claim of the Cramer patent, which is relied upon, it remains only to consider whether, as correctly construed, infringement resulted from the employment by the Singer Company of the device covered by the Diehl patent. We find no difficulty in reaching a conclusion on this branch of the case. The treadle supports devised by Diehl, though they serve the same purpose as the device described and shown in

the Cramer patent, are substantially different in construction. Irrespective of the question whether the treadle in the Diehl device is hung in the vertical cross brace proper, or in an addition thereto properly to be regarded as the lower cross rod or cross tie of the machine, it is manifest that the bearing is essentially different in construction from that of Cramer, and is not adapted to receive an oscillating bar; while the treadle is not supplied with long projections fitted to oscillate in the vertical cross bar on bearings therein, but is constructed to turn on point center screws which fit tightly in circular openings in projections from the vertical cross bar. *There is no substantial identity in the character of the two devices, unless, by substantial identity, is meant every combination which produces the same effect. The differences between the Diehl device and the Cramer construction are substantial and not merely colorable.*

The trial court should have granted the motion to direct a verdict for the defendant.

Id. at 285-86 (emphasis added).

In the present case, and as held in *Singer*, because we know what the claim means and we know what process parameters Warner-Jenkinson uses, the issue of infringement under the doctrine, that is, the scope of the claim, resolves itself into one of law. Under a correct application of the doctrine of equivalents, the trial court erred in denying Warner-Jenkinson's JMOL.³⁶

Nothing in *Graver II* warrants the finding of infringement in this case. The accused process does not substitute equivalents for each claim element. Hilton Davis set

³⁶ That Warner-Jenkinson also argued it was entitled to judgment as a matter of equity does not take away from its right to judgment as a matter of law.

the range of equivalent pH and pressure values by the claim language "approximately 6.0 to 9.0" and "approximately 200 to 400 p.s.i.g." It was not proved that 5.0 is the equivalent to one of skill in the art of approximately 6.0 to 9.0 pH or 500 p.s.i.g. is similarly equivalent to approximately 200-400 p.s.i.g. Hilton Davis had no claiming difficulties as in *Graver*.³⁷ There is no indication in the specification that the invention was broader than claimed. In any event, the patentee merely had to set wider ranges during prosecution (or within two years from issuance) if the claim language did not reflect his invention. The claim would then have been examined for patentability on that basis. Whether such a claim would have been allowed, we do not know and cannot speculate. Hilton Davis is bound by the ranges it specified.

2. Prosecution History Estoppel

Finally, with respect to the pH step, an additional restriction comes into play. The examiner *required* the specific pH range to be added to the claim to overcome prior art. The prosecution history contains the following Examiner's Interview Summary:

The Examiner stated that if claim 1 were amended to contain the pH range of 6 to 9, the rejection on prior art would be overcome.

Hilton Davis amended its claim accordingly. Furthermore, Hilton Davis's selection of a lower limit of 6.0 was intentional. Dr. Cook, an inventor, testified that Hilton Davis's process foamed undesirably if the pH dropped below 6.0. The specific amendment of the pH range by Hilton Davis in response to the Examiner's rejection precludes capturing the different process step of a pH of 5.0 used by Warner-Jenkinson.

Finding a process with a pH of 5.0 to be an infringement, assuming a pH of 5.0 and a pH of 6.0 were equivalent,

³⁷ See note 28, *supra*.

lents, would violate the principle of prosecution history estoppel. In *I.T.S. Rubber*, 272 U.S. at 444-45, the Court stated:

Nor can [the accused products] be held to be infringements even if we assume that, as asserted, they function in the same manner as three-point-contact lifts, and would infringe, as was conceded in the District Court, if the claims were not restricted by the limiting clause and were entitled to a construction warranting a wide range of equivalents. By the limitation of the claims in the Patent Office proceeding to the three-point-contact lift the patentee made this precise form a material element, and having thus narrowed the claims, cannot, as was said in the *Weber Electric Company* case, now enlarge their scope by a resort to the doctrine of equivalents. This would render nugatory the specific limitation.

Accord Exhibit Supply, 315 U.S. at 136-37; *LeHigh Valley*, 158 U.S. at 469.

Having narrowed the claim's range of pH to secure the Examiner's withdrawal of his prior rejection, Hilton Davis may not now resort to the doctrine to cover equivalents thereof. This would render nugatory the specific limitation of the range of pH.

Hilton Davis's concession that a pH of 5.0 is not "approximately 6.0 to 9.0" and that 500 psig is not "approximately 200 to 400 psig" should have ended this charge of infringement as a matter of law. There was no material fact issue on infringement to give to the jury. The only disputed fact issue here relates to the pore size of the membrane. However, that dispute becomes immaterial because the undisputed facts are controlling in any event. *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248 (1986). As a matter of law, the pH and pressure values in Warner-Jenkinson's process are outside the legal scope of protection of the '746 patent. It is surplusage to point

out that Warner-Jenkinson was not a "copyist" but developed its own process independently, an important factor in *Graver II*.

E. Conclusion

Under controlling Supreme Court precedent, the standard for infringement under the doctrine includes the legal limitation that a claim may not be *enlarged* beyond what was allowed by the Patent Office. In addition, the prosecution history creates an estoppel respecting the pH limitation. As in *Sanitary Refrigerator*, 280 U.S. 30, and *Singer Co.*, 192 U.S. 265, the issue of infringement resolves to a question of law.³⁸ Upon a correct application of the doctrine of equivalents to undisputed facts, the accused process does not infringe. Thus, the district court erred in not granting JMOL and entering judgment for Warner-Jenkinson.³⁹

As Warner-Jenkinson argues, it has been held liable without any possibility of notice that its process fell within the claims of the '746 patent. Claims must tell the public not only what it cannot do but also what it *can* do. *Permutit Co.*, 284 U.S. at 60. *Cf. A.B. Small Co. v. American Sugar Ref. Co.*, 267 U.S. 233, 239 (1925) (due process contravened where no specific or definite act was forbidden and liability depended on acts being "unjust and unreasonable in the estimation of the court and the jury.").

I would reverse the judgment of infringement.

³⁸ *Graver II* did not overturn the precedent of *Sanitary Refrigerator*. Indeed, the Court cited that case with approval in *Graver II*.

³⁹ The injunction enjoining pH values of 2.0-4.0, in any event, is too broad. A process with a pH of 2.0-4.0 was not found to be infringing. Only an infringing process may be enjoined. *KSM Fastening Sys. v. H. A. Jones Co.*, 776 F.2d 1522, 1526, 227 USPQ 676, 679 (Fed. Cir. 1985) (contempt for violating an injunction limited to devices found to infringe).

APPENDIX B

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

93-1088

HILTON DAVIS CHEMICAL CO.,
v. Plaintiff-Appellee,

WARNER-JENKINSON COMPANY, INC.,
Defendant-Appellant.

DECIDED: August 8, 1995

Before MAYER, Circuit Judge, COWEN, Senior Circuit Judge, and RADER, Circuit Judge.

PER CURIAM.

Hilton Davis Chemical Co. sued Warner-Jenkinson Co., Inc. for infringement of U.S. Patent No. 4,560,746 (the '746 patent). The jury found that the '746 patent was not invalid and that Warner-Jenkinson infringed under the doctrine of equivalents. The trial court entered judgment on the jury verdict. *Hilton Davis Chem. Co. v. Warner-Jenkinson Co.*, No. C-1-91-218 (S.D. Ohio June 22, 1992). Because the jury verdict that the '746 patent is not invalid is legally correct in light of the jury's underlying fact findings, which are supported by substantial evidence, this court *affirms*.

DISCUSSION

After this panel heard oral argument in this case, the court decided to rehear the appeal *en banc* to consider the important infringement issues raised concerning the doctrine of equivalents. After rehearing the appeal and

reaching its decision on the infringement issues, the court remanded the validity issues for consideration by this panel. This panel issues this validity opinion as a companion to the *en banc* infringement opinion also issued today. See *Hilton Davis Chem. Co. v. Warner-Jenkinson Co.*, No. 93-1088 (Fed. Cir. Aug. 8, 1995) (*en banc*). The facts are stated in the *en banc* opinion, familiarity with which the panel assumes.

The trial court submitted the issue of validity of the '746 patent to the jury. The jury found the patent non-obvious over the asserted prior art, not invalid for failure to name the correct inventors, and not invalid for failure to disclose the best mode. Warner-Jenkinson appeals the nonobviousness and inventorship findings.

Obviousness is a question of law based upon subsidiary fact questions, including (1) the scope and content of the prior art, (2) the differences between the prior art and the claimed invention, and (3) the level of ordinary skill in the art. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). Obviousness also involves consideration of objective indicia of nonobviousness, which again are fact questions. See *id.* at 17-18; *Texas Instruments Inc. v. United States Int'l Trade Comm'n*, 988 F.2d 1165, 1178, 26 USPQ2d 1018, 1028 (Fed. Cir. 1993). In this case, the trial court submitted obviousness to the jury without asking for answers to the subsidiary fact questions. This court must infer that the jury answered the questions in a way that supports its legal conclusion of nonobviousness. *Shatterproof Glass Corp. v. Libbey-Owens Ford Co.*, 758 F.2d 613, 621, 225 USPQ 634, 638 (Fed. Cir.), *cert. dismissed*, 474 U.S. 976 (1985). This court reviews the jury's inferred answers to the subsidiary fact questions for substantial evidence. *Id.*; see also *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1550, 220 USPQ 193, 199-200 (Fed. Cir. 1983).

Warner-Jenkinson's first obviousness contention is that the '746 claims, properly construed, do not require skip-

ping "salting out." Salting out is an expensive operation that involves adding salt to the reaction solution of a dye to crystallize the dye. The dye may then be filtered from the remaining solution substantially free of impurities.

The claim belies Warner-Jenkinson's claim construction. The claim states:

In a process for the purification of a dye selected from [a Markush group] as the products resulting, respectively, from [diazotization followed by coupling, or condensation followed by sulfonation, of five compounds], said dye being present in the resulting reaction mixtures, along with impurities, the improvement which comprises: *subjecting an aqueous solution of the reaction mixture resulting from said coupling or said sulfonation to ultrafiltration through a membrane . . . to thereby cause separation of said impurities from said dye . . .* (Emphasis added.)

Claim 1 thus subjects a solution of the *reaction mixture* to ultrafiltration—not a solution of the crystallized product of salting out of the reaction mixture. Claim 1 skips the salting out step.

The '746 specification describes a process that includes a salting out step, and the inventors amended claim 1 during prosecution to recite "subjecting" instead of "directly subjecting" the solution of the reaction mixture to ultrafiltration. The plain meaning of the claim language, however, excludes salting out. "The claim is a statutory requirement, prescribed for the very purpose of making the patentee define precisely what his invention is; and it is unjust to the public, as well as an evasion of the law, to construe it in a manner different from the plain import of its terms." *White v. Dunbar*, 119 U.S. 47, 52 (1886). The plain import of claim 1 is to exclude salting out.

To show obviousness, Warner-Jenkinson relied at trial on three prior art references: the Booth patent; Osmonics

Bulletin No. 109 (the Osmonics Bulletin); and U.K. Patent No. 1,359,898 (the British patent). The Booth patent discloses an ultrafiltration process for purifying colorant solutions. However, the Booth patent describes colorants having greater molecular sizes than those purified in the '746 process. The Booth process also uses a pH higher than 9, preferably from 11 to 13, and pressures from 25 to 200 p.s.i.g., preferably 75 to 125 p.s.i.g. The Booth patent thus teaches higher pHs and lower pressures than those specified in the claims of the '746 patent. Finally, the Booth patent teaches salting out, which the inventors disclaimed to secure allowance of the '746 patent.

The Osmonics Bulletin discloses various membranes for ultrafiltration. The inventors discussed the Bulletin in the '746 patent specification. The Bulletin does not suggest the particular combination of membrane pore sizes, pHs, and pressures for purifying food dyes as claimed in the '746 patent. Moreover, Warner-Jenkinson's lack of success, and Hilton Davis' initial lack of success, in producing acceptable purification results using information from the Bulletin supports the jury's finding that the '746 method is nonobvious in view of the Bulletin.

The British patent discloses a process for removing salt from textile dyes to prevent separation during storage. That process removes residual salt from dyes after salting out. In contrast, the '746 process replaces salting out. One example in the British patent teaches starting with a solution where the dye cannot be salted out without great difficulty. Trial testimony, however, showed that the process in this example yielded a dye of unspecified purity, rather than a food dye of approximately 90% purity as claimed in the '746 patent. Also, Warner-Jenkinson presented no evidence that the prior art suggested the pore size and pressure ranges disclosed in the British patent would separate impurities from dye in the Hilton Davis process.

Warner-Jenkinson also asserts its unsuccessful 1982 test at Osmonics as prior art. Osmonics performed the test for Warner-Jenkinson under a secrecy agreement. Therefore, the test can only qualify as prior art under 35 U.S.C. § 102(g) (1988). See *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1549-50, 220 USPQ 303, 309-10 (Fed. Cir. 1983) (secret use is not prior art under 35 U.S.C. § 102(a), (b) (1988)), *cert. denied*, 469 U.S. 851 (1984). Warner-Jenkinson's 1982 test, however, was not successful, showing that Warner-Jenkinson did not actually reduce the tested process to practice as required for section 102(g) prior art. *Kimberly-Clark Corp. v. Johnson & Johnson*, 745 F.2d 1437, 1444-45, 223 USPQ 603, 607 (Fed. Cir. 1984). Moreover, Warner-Jenkinson's failure to use the process for three and one-half years indicates abandonment, suppression, or concealment—still another consideration disqualifying the process as section 102(g) prior art. See *Lutzker v. Plet*, 843 F.2d 1364, 1367-68, 6 USPQ2d 1370, 1371 (Fed. Cir. 1988).

Objective considerations such as commercial success and failure of others also support finding nonobviousness. See *Graham*, 383 U.S. at 17-18. Dyes purified with the '746 process have enjoyed significant commercial success because of the reduced cost of the claimed method. Warner-Jenkinson's failure to successfully practice ultrafiltration at the time of Hilton Davis' conception in 1982 also suggests the nonobviousness of the '746 process.

The record shows differences between the prior art and the '746 process. The record also shows objective factors favoring nonobviousness. In short, the record contains substantial evidence supporting the findings the jury could have made to conclude that the '746 process was non-obvious over the cited prior art references. See *Shatterproof*, 758 F.2d at 621.

Because courts presume patents to correctly name the inventors, claims of improper inventorship are "subjected

to the closest scrutiny." *Amax Fly Ash Corp. v. United States*, 514 F.2d 1041, 1047, 182 USPQ 210, 215 (Ct. Cl. 1974) (quoting *The Barbed Wire Patent*, 143 U.S. 275, 285 (1892)). "Such defenses are highly technical; courts disfavor these defenses on the strength of the legal presumption that the inventors named in a patent are the true ones." *General Motors Corp. v. Toyota Motor Co.*, 667 F.2d 504, 507, 212 USPQ 659, 662 (6th Cir. 1981), *cert. denied*, 456 U.S. 937 (1982). Inventorship is a question of law, reviewed *de novo* on appeal, with "any facts found . . . in reaching an inventorship holding . . . reviewed for clear error" in an appeal from an interference proceeding, *Sewall v. Walters*, 21 F.3d 411, 415, 30 USPQ2d 1356, 1358 (Fed. Cir. 1994), or for substantial evidence in an appeal from a jury verdict.

Warner-Jenkinson challenges the validity of the '746 patent on the ground that Drs. Cook and Rebhahn, the named inventors, derived the claimed ultrafiltration process from Osmonics. Derivation requires communication of "at least so much of the claimed invention as would have made it obvious to one of ordinary skill in the art." *New England Braiding Co. v. A.W. Chesterton Co.*, 970 F.2d 878, 883, 23 USPQ2d 1622, 1626 (Fed. Cir. 1992). Derivation is a question of fact. *Price v. Symsek*, 988 F.2d 1187, 1190, 26 USPQ2d 1031, 1033 (Fed. Cir. 1993). When the jury returned its verdict that Cook and Rebhahn, not Osmonics employees, invented the claimed process, it necessarily found that Cook and Rebhahn did not derive the claimed invention from Osmonics. This court reviews that implied fact finding for substantial evidence: "To the extent that conflicting viewpoints were presented [on derivation], this was within the province of the jury." *Shatterproof*, 758 F.2d at 624.

Substantial evidence supports the jury's finding that no one at Osmonics communicated sufficient knowledge to Cook to make an inventive contribution. Gach was the Osmonics employee who assisted Cook in testing ultra-

filtration. Although Gach attempted to take credit for the '746 process at trial, he testified that to protect the confidentiality of Osmonics' relationship with Warner-Jenkinson, he concealed from Cook his knowledge of food dye purification gained from his work with Warner-Jenkinson. Cook testified that he received no intimation that Gach had any experience with a process similar to Hilton Davis', and that he used trial-and-error to identify an effective process. Significantly, Gach evaded questioning about Cook's role in the testing process, stating that he "cannot recall" whether Cook made observations and analyzed results.

Substantial evidence thus supports finding that instead of deriving the '746 process from Gach, Cook only directed Gach to assist him with developing the process. Gach's assistance is not enough to invalidate the '746 patent. "An inventor 'may use the services, ideas, and aid of others in the process of perfecting his invention without losing his right to a patent.'" *Shatterproof*, 758 F.2d at 624 (quoting *Hobbs v. United States Atomic Energy Comm'n*, 451 F.2d 849, 864, 171 USPQ 713, 724 (5th Cir. 1971)). The president of Osmonics testified, further more, that when Cook and Rebhahn obtained a patent on their invention, Osmonics chose not to pursue an inventorship claim. Moreover, during Gach's testimony, counsel for Warner-Jenkinson disclaimed offering Gach as an inventor.

In sum, there is substantial evidence that Cook did not derive the '746 process from Gach or anyone else at Osmonics. The '746 patent names the correct inventors.

The jury verdict that the '746 patent is not invalid is legally correct in light of the jury's underlying fact findings, which are supported by substantial evidence. Therefore, the judgment of the district court on validity is affirmed.

APPENDIX C

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF OHIO
WESTERN DIVISION

Civil No. C-1-91-218

HILTON DAVIS CHEMICAL CO.,
Plaintiff,

vs.

WARNER-JENKINSON COMPANY, INC.,
Defendant.

TRANSCRIPT OF PROCEEDINGS
BEFORE THE HONORABLE HERMAN J. WEBER, JUDGE

Cincinnati, Ohio

Tuesday, October 20, 1992

* * * *

[41] THE COURT: It is my intent, and I hope that I can do it, and that is to make the necessary comments that will protect the record for the parties. I am not trying to make this record to protect any decision this Court makes. I'm attempting to protect the rights of the parties.

It is my understanding that the motion for judgment as a matter of law are based on several issues. One is the issue of obviousness which both parties agree is a matter of law. The inventors, who invented the '746, as I will refer to it, whether an inventor was omitted from

the application. The best mode defense. Another issue is that the infringement should be decided [42] in favor of the defendant as a matter of law; that there was estoppel as a result of the prosecution history and, therefore, the Court should deny the infringement claim; that the doctrine of equivalents is inapplicable to the situation. And the issue of lost profits we have discussed to some degree, but it's raised in the motion as well; and the willful infringement issue which we've discussed previously today.

Under plaintiff's theory that I am bound by the jury's determination has been conceded by the defendant—or excuse me, has been conceded by the plaintiff that it, the jury verdict in favor of the defendant on that issue, is final.

The Court will attempt to discuss the matters in hopefully some logical order and will attempt to discuss the obviousness issue which is paramount in the Court's mind so that the record will understand the consideration the Court has given these matters.

When we discuss the obviousness, why, we must consider the prior art. The prior art has been listed by both parties, and it is—the parties are in agreement as to the prior art that must be considered with the exception of the Koll, that's K-o-l-l, patent. That was Exhibit 124. The plaintiff maintains that it is part of the prior art. The defendant maintains that it is not. [43] This Court determines that the Koll patent is part of the prior art in the case.

The prior art, then, is listed as the Bollenback patent; the Adams patent; the Teed patent; the Booth patent; the South African 1981 and EPO 1982 patents; the Osmonics Bulletin Number 109; the British patent; the Lee and Wiley article; the Woo article; the Bardin patent; the Koll patent; the Osmonics brochure "Ultrafiltration and Reverse Osmosis Systems"; Scientific American Article, Exhibit 512; the prior work of Warner-Jenkinson;

the prior Osmonics work using test dyes; and other applications of membrane separation.

The Booth patent, one of the issues in the case and one of the arguments raised by defense was the fact that the patent examiner obviously didn't properly consider the Booth patent. This Court finds that the evidence is such that the Court concludes that the Booth patent was thoroughly considered by the patent examiner. The special process of pore size, pressure, and pH in the Hilton Davis process was dissimilar to the Booth, was nonobvious, and the Hilton Davis patent was novel.

The inventors of U.S. Patent '746 conceived a special process which skipped the salting-out steps and produced FDA certified quality with low dye loss FD&C Red 40 and FD&C Yellow 6 directly from the coupling solution [44] using membrane separation technology. It is a continuous and commercially process—and it is commercially viable.

The pertinent prior art was considered appropriately by the patent examiner who determined that the special process contained in the '746 patent was novel and unobvious. This determination is proper and correct under the evidence.

The defendant argued and presented the case to the jury that the patent examiner somehow or other was influenced by the patent agent of Hilton Davis or of the inventors. This Court finds that the actions of the patent examiner were proper in this case, and this Court cannot find by clear and convincing evidence that the patent examiner acted in any way improperly in issuing '746.

The plaintiff argued that the—or excuse me, it was the defendant argued that the plaintiff failed to supply the teachings of the British patent to the patent examiner. This Court finds that the British patent is similar to the Booth, the EPO, and the South African patents. The British patent is no more pertinent to the patentability of '746 than was the South African patent.

The Booth process maintained a pH above 9 and pressures of 200 to 400 psig and was not commercially [45] successful. The Booth process was in no way suggestive of the '746. The process conditions of '746 are not taught or suggested by the Colour, C-o-l-o-u-r, Index.

The distinction between Booth and '746 is the claims of the '746 patent of pH 6 to 9 and 200 to 400 psig, while Booth used greater than pH 9 and less than 200 psig. The '746 patent process must not be above pH 9 so that the membrane of 5 to 15 Angstroms would be protected from damage. The pH is important to the chemistry involved in the purification process and will be important to preserving the membrane.

The pressure required by the '746 is important and does have an effect. These important instructions in the '746 distinguish it from the Booth patent.

The British patent includes salting out as part of the process. '746 eliminates the salting-out process. The alternate process of Example 22 of the British patent is not relevant to the problems facing the inventors of the '746.

The large pore size of the British patent distinguish it from '746.

Taken as a whole, these are significant differences between the British and the Booth patent and the '746.

There is substantial evidence in the record, [46] including the testimony of Dr. Kinman, K-i-n-m-a-n, that supports the reasonable conclusion that the subject matter of '746 would not have been obvious to a person of ordinary skill involved with dye processing and that the process patented in '746 was unobvious.

Dr. Cook with some—I'm moving on now to another subject, inventors. Dr. Cook with some suggestions from Dr. Rebhahn, R-e-b-h-a-h-n, were the only inventors of '746. From the inventors' point of view, the preferred way of carrying out the claimed process was through a membrane having a nominal pore diameter of 7 to 11 Angstroms, operating at a pressure of 200 to 400 psig,

within a pH range of 6 to 9. A 30 HCA membrane was not any better than the 20 VF and the 0 PA membranes disclosed specifically in the patent.

Plaintiff was the first to successfully achieve a commercially viable continuous process for purifying FD&C Red 40 and FD&C Yellow 6 food dyes to FDA purity levels directly from the coupling solution without an intervening salting-out step, and defendant has used that process to its profit. There is a legally sufficient evidentiary basis for a reasonable jury to have found that the party with respect to that issue—found for that party with respect to that issue in favor of plaintiff.

[47] Based on the scope and content of the prior art, including the British patent, the difference between the prior art and the claims of '746 in issue and the level of ordinary skill of those engaged in the art of purification of the FD&C Red 40 and FD&C Yellow 6, the court finds that the '746 patent can be accepted as valid because the subject matter of '746 is different than the prior art to such an extent that the subject matter as a whole would have been unobvious at the time the invention was made to a person having ordinary skill in the art of purification of FD&C Red 40 and FD&C Yellow 6.

As to the work of Warner-Jenkinson and Osmonics, the work that they did was not made public, and they did this for justified business reasons, and the Court finds that their reasons were justified; but since their work was not in the public domain, it cannot be considered as relevant to the discussion of the prior art available to the inventors.

The '746 is commercially successful. It is the first and only process which successfully eliminates the salting-out process in the manufacture of FD&C Red 40 and FD&C Yellow 6. None of the prior art taught this process as a whole.

I've concluded that the Koll patent as part of the prior art teaches away from the '746.

[48] The defendant has not convincingly established that the '746 as a whole would have been obvious in 1982, 1983, and 1984 to a person of ordinary skill in the art of dye purification. Such ordinary person would be knowledgeable in dye chemistry, and I'm trying to define at this point my obligation to define what an ordinary person's knowledge would be. Such an ordinary person would be knowledgeable in dye chemistry but little background in membrane separation but would have knowledge of all the prior art which we have set forth.

In this regard, as I have previously said, Warner-Jenkinson's process did not work while the Hilton Davis process did work is interesting because it puzzled Osmonics why this particular phenomena took place.

Considering all the evidence, the Court finds that Dr. Kinman's testimony is credible. Therefore, this Court concludes that defendant has failed to prove by clear and convincing evidence that '746 is invalid.

Defendant argued at trial that Osmonics or others invented the '746 process. This Court respectfully disagrees. Dr. Cook with some help from Dr. Rebhahn was the inventor of the process known as '746.

Defendants have failed to establish by clear and convincing evidence that Dr. Cook knew a better mode of carrying out the claims of '746 than he disclosed in the [49] specifications on November 30, 1984.

This Court concludes that the defendant has infringed the '746 in manufacturing FD&C Red 40 and FD&C Yellow 6 by using the same process in substantially the same way and achieving the same result. On this point, I conclude Dr. Kinman's testimony is reliable and follow his opinion.

Plaintiff has established by a preponderance of the evidence that defendant has infringed '746 under the doctrine of equivalents.

In summary, on the issue of obviousness, the Court finds as a whole that '746 was unobvious to a person of ordi-

nary skill in the art in 1982, '83, and '84. Two, that Dr. Cook, on inventorship, Dr. Cook and Dr. Rebhahn conceived the '746; that Mr. Gach, G-a-c-h, was not an inventor. Three, on the issue of the better mode, Dr. Cook and Dr. Rebhahn did not conceal the better mode when they failed to put the 30 HCA specifically in the patent, but did use the other two membranes in the patent. Four, on the issue of infringement, the Court finds that the evidence supports the finding of the jury and the infringement of the patent by using a process which performed the same function in substantially the same way to yield the same result as '746.

The Court finds that the issue of prosecution [50] history estoppel, plaintiff did not surrender the psig above 400 or pH below 6. In this regard, the Court has already found, and I want the record to be clear, that the upper limit of the psig of plaintiff's invention is approximately the 400 psig figure, and this Court finds that the use of a psi at the input of the membrane of 500, over 5—500 or above is not an infringing act.

MR. SCHMIT: Excuse me, Your Honor.

THE COURT: Yes.

MR. SCHMIT: Can we have read back the sentence just before the one that you gave?

THE COURT: Sure.

(The record was read.)

MR. SCHMIT: Are those two consistent with each other if the upper limit is 400, as you said at the first sentence, but that anything over 500 is not an infringement?

THE COURT: Well, the finding that I wish to make is that the plaintiff did not surrender the psig above 400, but I am putting—I mean, I do not see from the result of what's going on now that getting into a psig of 500 is not—is beyond even my extension of the 400 figure.

MR. SCHMIT: Okay. Thank you for the clarification.

[51] THE COURT: Did we get that straight? I have to depend upon your expertise in some of these matters, which I have throughout the course of the trial.

The Court also finds that there is no—that no hypothetical claim literally describing defendant's process as was described at trial reads on any prior art.

The doctrine of equivalents is applicable to this case, and I find so and I hold.

The willful infringement has been conceded. The jury verdict is firm. There is no willful infringement at this point in time.

* * * *

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APPENDIX D

[Filed Jun. 22, 1992]

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF OHIO

Case Number: C-1-91-218

HILTON DAVIS CHEMICAL COMPANY

v.

WARNER-JENKINSON COMPANY, INC.

CORRECTED

JUDGMENT IN A CIVIL CASE

(Entered Nunc Pro Tunc)

- ☒ Jury Verdict. This action came before the Court for a trial by jury. The issues have been tried and the jury has rendered its verdict.
- ☐ Decision by Court. This action came to trial or hearing before the Court. The issues have been tried or heard and a decision has been rendered.

IT IS ORDERED AND ADJUDGED

that Judgment is entered in FAVOR of the Plaintiff, Hilton Davis Chemical Company, and AGAINST the Defendant, Warner-Jenkinson Company, Inc., in the amount of \$3,564,705.00 (THREE MILLION FIVE HUNDRED AND SIXTY-FOUR THOUSAND SEVEN HUNDRED AND FIVE DOLLARS) PLUS COSTS AND INTEREST AT THE LEGAL RATE.

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Date June 22, 1992

KENNETH J. MURPHY, JR.
Clerk

/s/ Karen F. Jones
KAREN F. JONES
(By) Deputy Clerk

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[Filed Oct. 20, 1992]

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF OHIO
WESTERN DIVISION

C-1-91-218

HILTON DAVIS CHEMICAL Co.,
Plaintiff

v.

WARNER-JENKINSON,
Defendant

ORDER

Pursuant to the record made at the Conference/Hearing held October 20, 1992 in open court and for the reasons and conclusions stated in the record, the Court rules as follows:

Doc. No. 91—Defendant's Motion to Alter Judgment is DENIED.

Doc. No. 92—Defendant's Motion for Judgment As a Matter of Law is DENIED.

Doc. No. 93—Plaintiff's Motion for Registration of Judgment—DENIED AS MOOT.

Doc. No. 132 Defendant's Motion to File is GRANTED.

Doc. No. 138 Plaintiff's Motion to File is GRANTED.

Doc. No. 139 Plaintiff's Motion for Trebling Damages and for Attorney's Fees is DENIED.

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Doc. No. 140 Plaintiff's Motion to Compel is GRANTED under the conditions stated by the Court.

Plaintiff's Oral Motion to Conform the Judgment to the Jury Verdict is GRANTED and the Judgment is CORRECTED to conform to the verdict of the jury of \$3,564,705.00 *Nunc Pro Tunc* to June 22, 1992. This case is TERMINATED on the docket of this Court.

IT IS SO ORDERED.

/s/ Herman J. Weber
HERMAN J. WEBER
Judge
United States District Court

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[Filed Oct. 20, 1992]

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF OHIO
WESTERN DIVISION

C-1-91-218

HILTON DAVIS CHEMICAL Co.,
Plaintiff

v.

WARNER-JENKINSON,
Defendant

PERMANENT INJUNCTION

This matter is before the Court on plaintiff's Motion for a Permanent Injunction following a jury verdict finding U.S. Patent No. 4,560,746 valid and infringed. After consideration of the verdict of the jury, the evidence introduced at trial, memoranda submitted by the parties and arguments of counsel, the Court finds that plaintiff's Motion should be granted.

IT IS, THEREFORE, ORDERED, ADJUDGED AND DECREED that defendant, Warner-Jenkinson Company, Inc., and its officers, agents, servants, employees, successors in interest and assigns, and any other person, corporation or organization acting in concert with any of them, are hereby permanently enjoined and restrained during the life of U.S. Patent No. 4,560,746 from infringing claims 1, 2, 3, 13 or 14 of U.S. Patent No. 4,560,746 by selling or manufacturing FD & C Red 40 and FD & C Yellow 6 made at a pH less than 9.01 and at pressures at the input to the first membrane of less than 500 p.s.i.g.

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This injunction shall become effective immediately.
IT IS SO ORDERED.

/s/ Herman J. Weber
HERMAN J. WEBER
Judge
United States District Court